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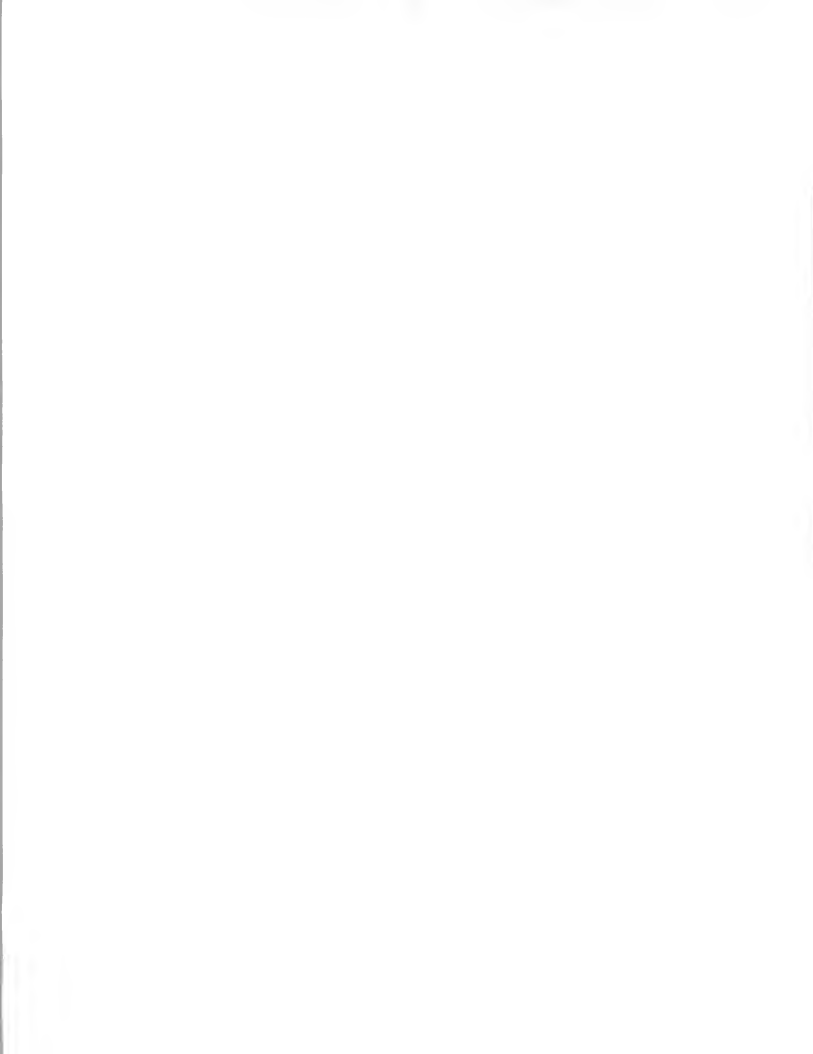
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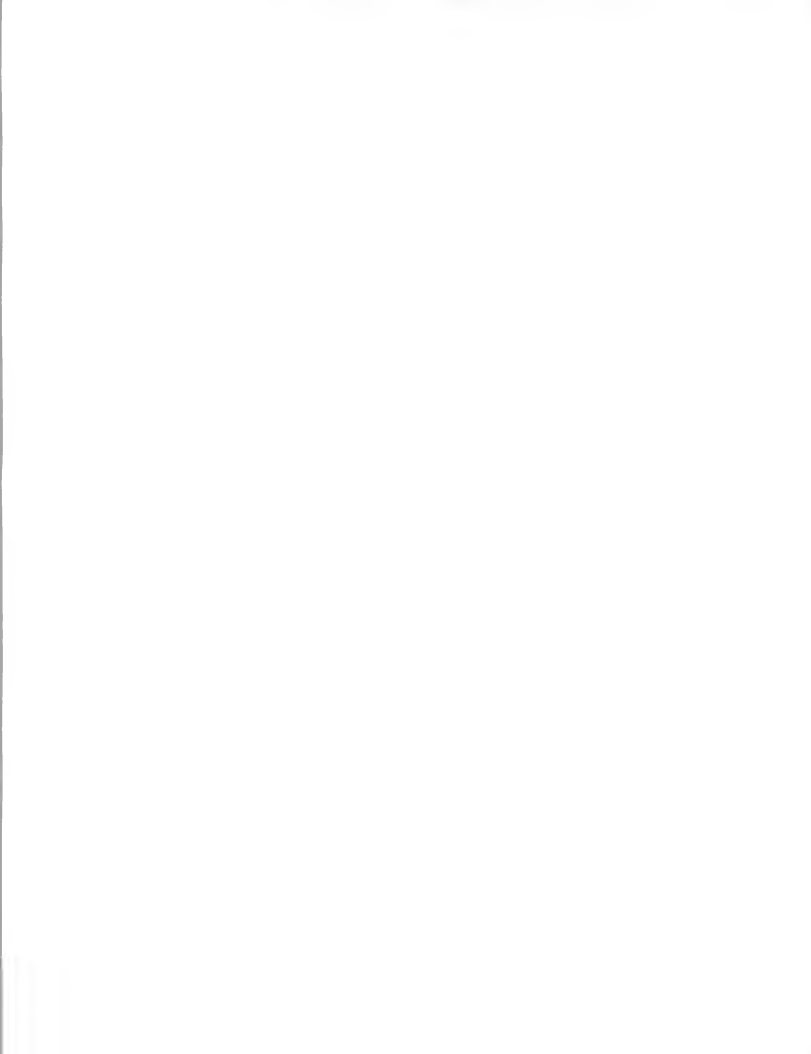
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MARCH 1990

SERVICE VENDOR ANALYSIS

MIDRANGE SYSTEMS



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Customer Service Program (CSP)

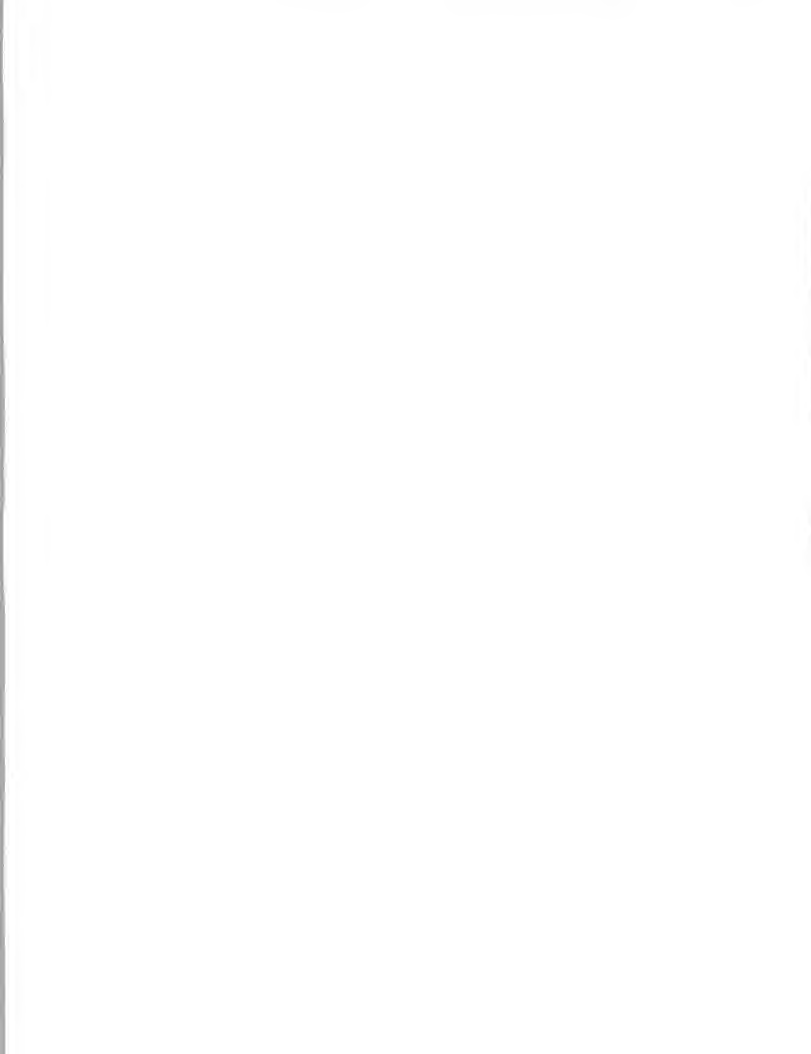
Service Vendor Analysis—Midrange Systems

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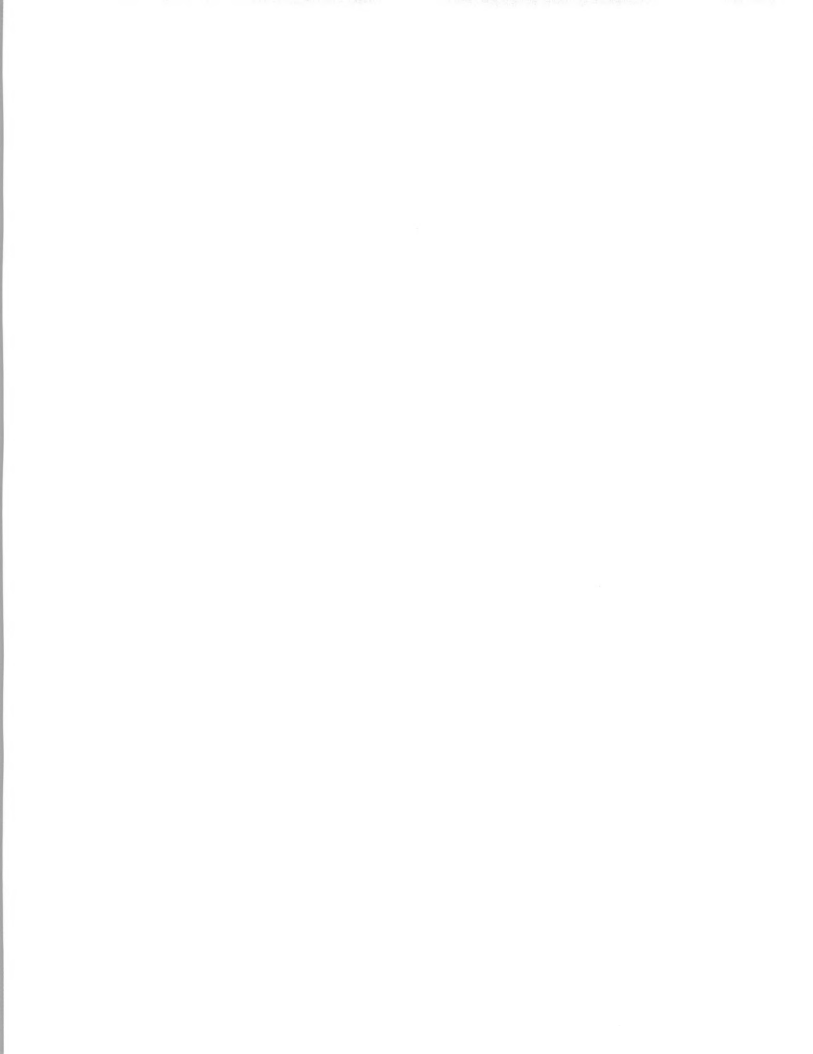
Abstract

This report, *Service Vendor Analysis—Midrange Systems*, is the second deliverable in the midrange systems module of INPUT's 1989 Customer Service Program. The first report, *Midrange-Systems Service Analysis*, measured user requirements for and satisfaction with service and support as provided by leading vendors of midrange systems. The last report in the series, *Service Market Analysis*, will provide a current market size and five-year forecast for large and midrange systems, third-party maintenance, PCs, and ancillary services, as well as summarize the year's research findings.

The report contains profiles of the service organizations of 11 leading midrange-systems vendors: AT&T, Bull HN, Concurrent Computer, Data General, Digital Equipment Corporation, Hewlett-Packard, IBM, NCR, Prime, Tandem, and Wang. Each profile begins with a short discussion of the company and important service news items from the past year. Next, each profile presents demographic data about the service organization, including revenue totals, employee counts, and office locations, when available. Each profile concludes with a discussion of service delivery, including contract coverage and services provided.

Following these profiles, the report provides summary tables of key service information about the profiled service organizations. These tables will allow quick comparisons between companies analyzed in this study.

The report contains 85 pages, including 22 exhibits.



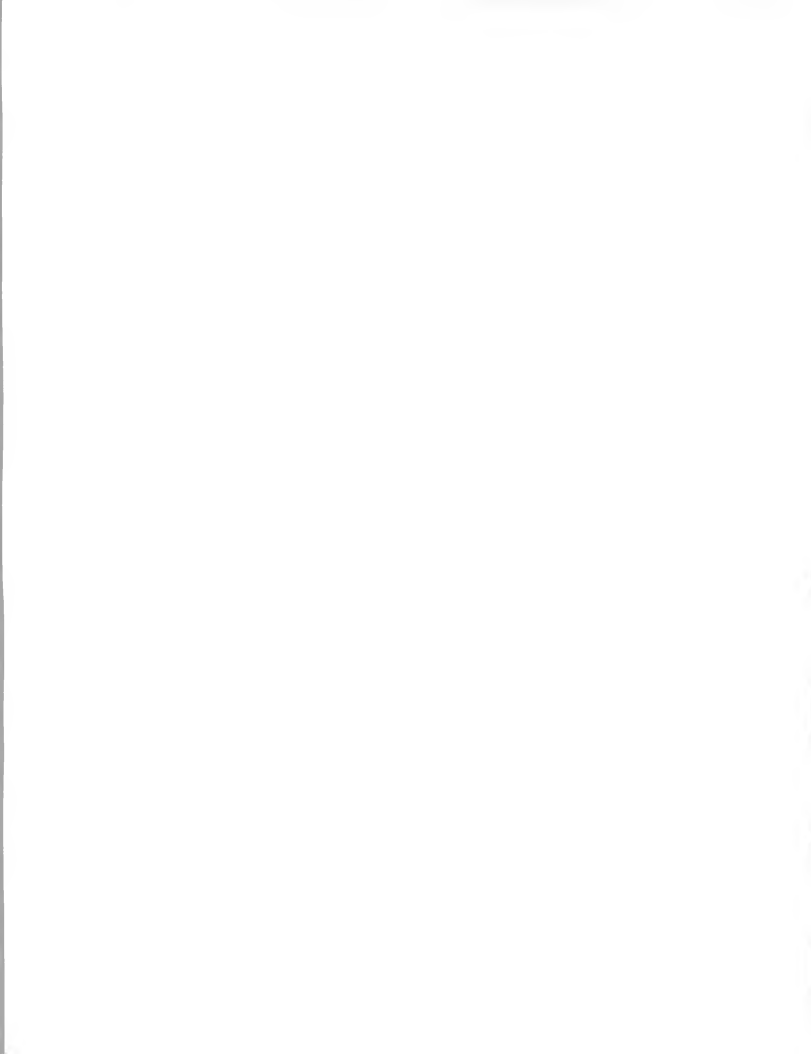
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Introduction







Introduction

This report, *Service Vendor Analysis—Midrange Systems*, is the second deliverable in the midrange systems module of INPUT's 1989 Customer Service Program. The first report, *Midrange Systems Service Analysis*, measured user requirements for and satisfaction with service and support as provided by leading vendors of midrange systems. The last report in the series, *Service Market Analysis*, will provide a current market size and five-year forecast for large and midrange systems service, third-party maintenance, PCs, and ancillary services, and will summarize the year's research findings.

A

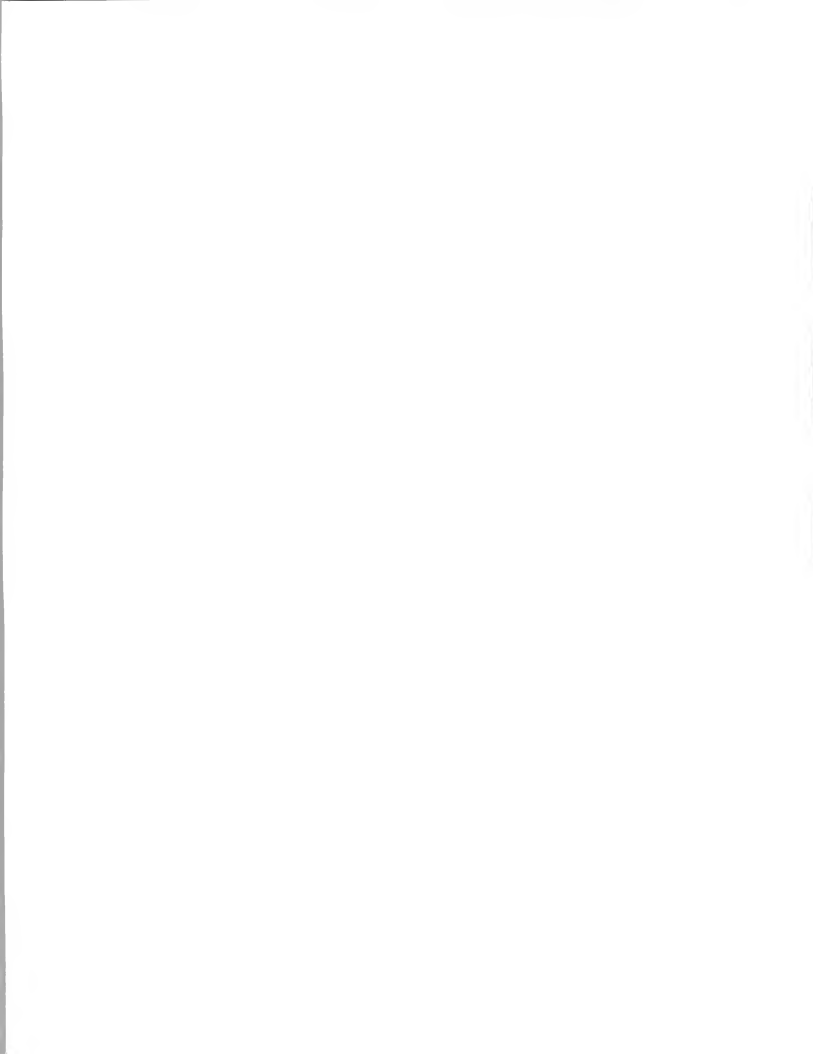
Scope

This report contains profiles of the service organizations of 11 leading midrange systems vendors: AT&T, Bull HN Information Systems (formerly Honeywell Bull), Concurrent Computer Corporation, Data General, Digital Equipment Corporation, Hewlett-Packard, IBM Corporation, NCR Corporation, Prime, Tandem, and Wang.

Each profile begins with a short discussion of the company and important service news items from the year just past. Next, each profile presents data about the service organization, including revenue totals, employee counts, and service locations where available. Each profile includes a discussion of important service delivery processes, including contract coverage and services provided, as well as commentary on the strategic direction the service organization seems to be taking.

Following these profiles, the report provides summary tables of key service information about the profiled service organization. These tables will permit quick comparisons between companies analyzed in this study, as well as provide several years' trending data.

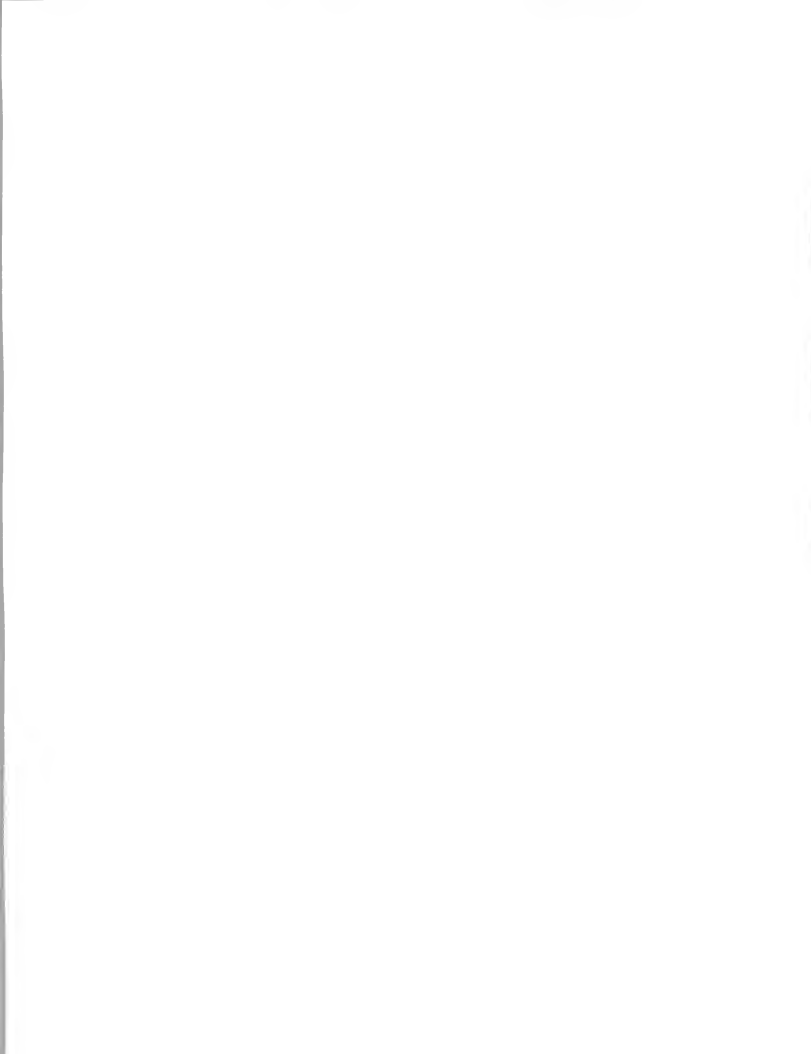
Appendixes at the end of this study contain an example of the survey questionnaire used for this study and a list of definitions used in this report.



B**Methodology**

INPUT surveyed the companies profiled in this study, using the questionnaire shown in Appendix A. In most cases the companies willingly shared information about their operations and programs; in a few cases, however, selected data was considered to be confidential, so INPUT supplemented the information gathered during the survey with data contained in our Information Center, located in our Mountain View, CA, headquarters office. Annual reports, 10Ks, press releases, marketing brochures, press clippings and independent observations have all been used as supplementary information.

Analytical comments are the result of INPUT's analysis and do not necessarily represent the views of the companies studied in this publication. Worldwide services revenues indicated in this report include a wide range of offerings and in some instances may not be directly compared between companies. When U.S. services revenues are mentioned in the body of a specific company profile, a narrower, more conventional definition has been applied to permit more direct comparability.





Service Vendor Profiles







Service Vendor Profiles

AT&T CORPORATION

295 North Maple Avenue
Basking Ridge, NJ 07920
(201) 221-2000

Robert E. Allen, Chairman and CEO

Total Employees: 304,000

Total 1988 Revenue: \$35,210 million

Total 1988 Service Revenue: \$1,491 million*

* Includes installation, movement and rearrangement, maintenance and other services for data and communications products.

The Company

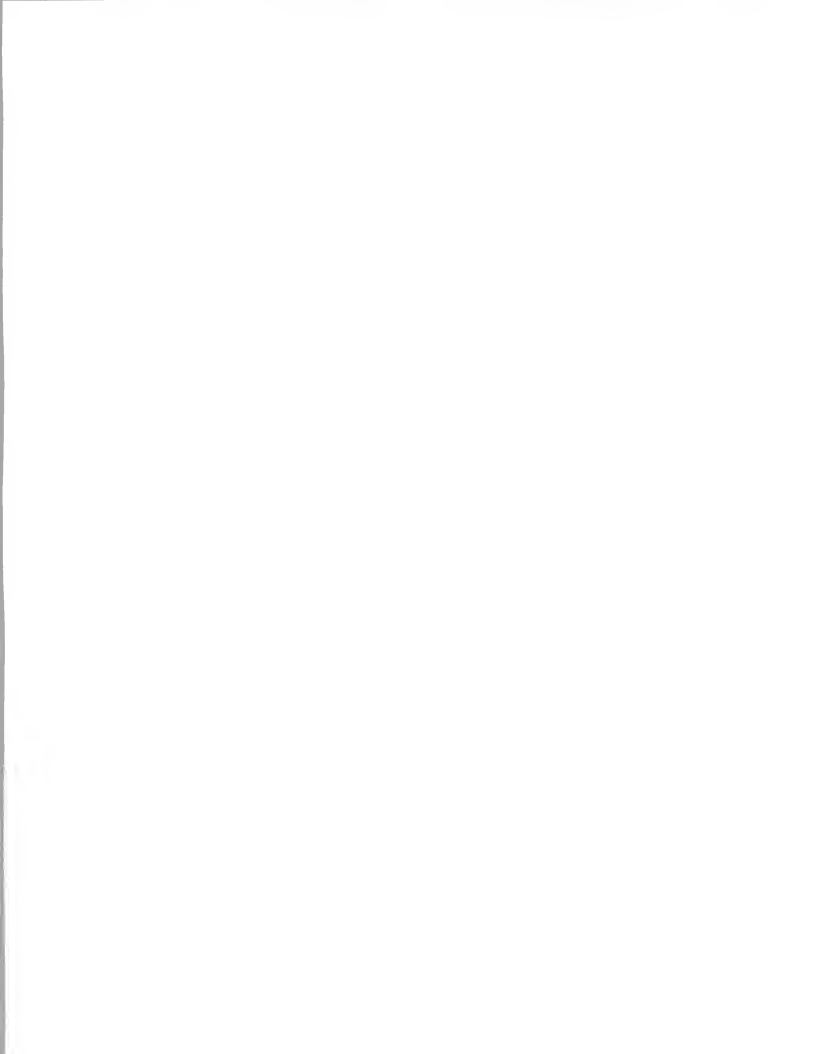
AT&T's business is "moving and managing information, domestically and globally," according to company reports. Major markets include consumer long distance service, switching systems, transmission equipment and operations support for the telecommunications industry, advanced electronic components for internal consumption and sale to other high-technology firms, and a wide range of voice and data services, computer and data networking products and systems for business and government. AT&T also develops customized data networking solutions which connect incompatible and widely dispersed computer systems into integrated networks.

In 1988, business, data and consumer products accounted for 22.5% of AT&T's revenue. For 1988, AT&T experienced a loss, due only to expenses incurred to accelerate its modernization program; operating profits were consistent with prior years' results, at about 10.4% pretax. Without the one-time write-down for modernization, per share profits increased 12% in 1988 compared to 1987. Total revenue increased 4.3%.

The company reported some growth in 1988 in unit sales of large business communications equipment, but flat year-to-year revenues in this category due to pricing pressure. The company also reported flat sales of data products, including personal computers, midrange computers, software and peripherals.

However, 1989 growth of the Data Systems group may be in the 30-35% range, as the group's annual sales approach \$2.1 billion. During 1989 the company captured a number of major programs, including a \$929 million two-year deal (extendable for additional purchases through 1994 and for maintenance through 1997) with the U.S. Air Force for computers, networks and integration services. AT&T also claims awards of \$100 million from American Airlines, \$25 million from Firestone, \$25 million from the New York State Health Department, and \$16 million from Trusthouse Forte, all of which involve PCs, peripherals, applications and networking software.

While AT&T's computer business has been suffering annual losses in excess of \$200 million, its 1989 loss may shrink to less than \$50 million and 1990 may be a breakeven year.



The company is focusing its development efforts in five major market categories—lodging, retail, government, finance, and health care—all of which are expected to benefit from AT&T's custom computer and network applications. Intel is now the company's supplier of IBM-compatible PCs, Pyramid Technology provides super-minicomputers, and AT&T's acquisition in February 1989 of Paradyne (headquartered in Largo, FL) will expand its line of network management systems, diagnostic modems and data communications equipment. AT&T is also an equity owner (13%) of Sun Microsystems.

Early in 1989, AT&T reorganized into 19 separate business units and 24 divisions, a move the company suggests will permit increased focus on specific customers and markets. The first such group is AT&T Paradyne, which has responsibility for "data communications equipment." The company is also consolidating its Material Management Services division to help reduce repair and product distribution costs and better support AT&T's business units. AT&T has announced a five-year plan to reduce overall headcount by 16,000, principally through attrition.

Service Demographics

Service revenues increased in 1988 by 7.1%, compared with 1987. Judging from AT&T's annual service revenues, we estimate total service headcount is in the range of 14,000.

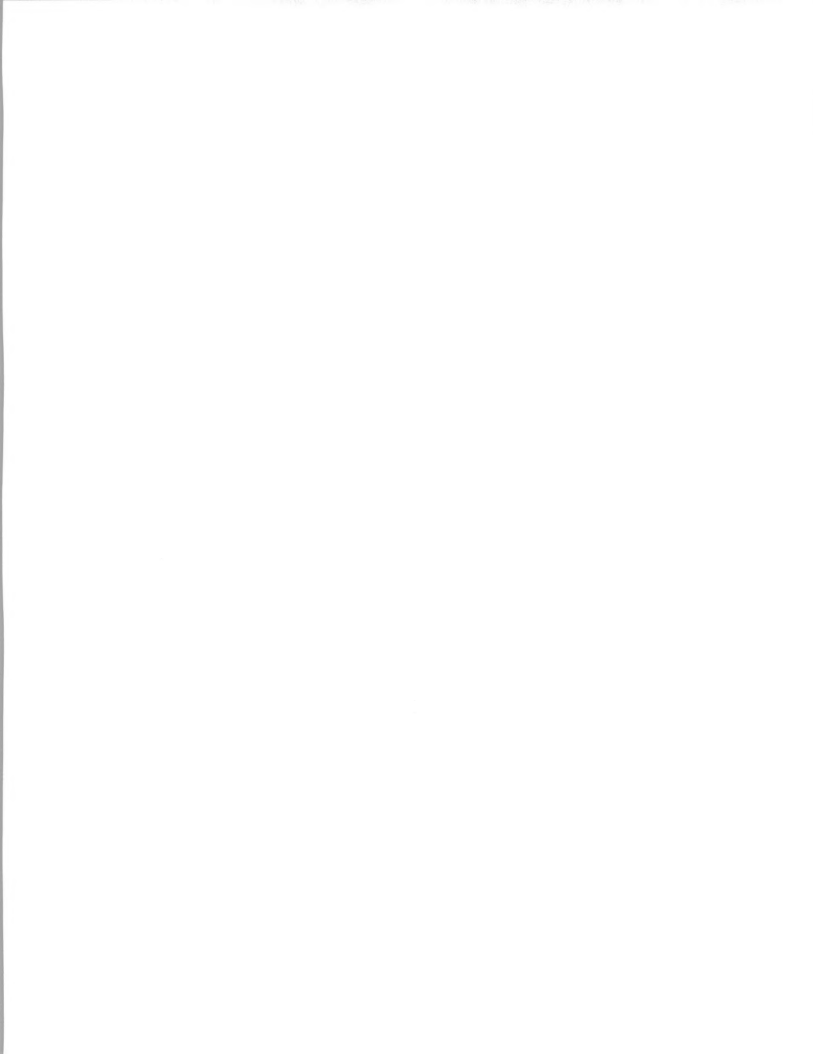
AT&T Data Services advertises a workforce of "over 2,000 expert hardware and software technicians." Specific feedback from AT&T is that 3,616 employees are part of the AT&T Data Services organization, of which 3,380 are in the field, operating from 280 different servicing locations. The non-field support organization makes up only 17% of the total employment reported, which we find unusually low compared to many other companies studied in this program.

Data Services technicians work out of over 280 locations which also serve as parts stocking facilities. Customer services from these locations include installation, warranty (standard and enhanced), standard or customized maintenance agreements, dedicated on-site technicians, software support, premises distribution services consulting, network management and time-and-materials support.

Service Delivery

AT&T provides a variety of standard maintenance offerings:

- **Hotline Service** provides users with access to AT&T support personnel to aid in the reporting, diagnosis and resolution of hardware and software problems. Remote diagnosis and software fixes are implemented in many cases while the user is on the line. Should a problem require further attention, the hotline staff will automatically release a field



engineer to the user site without an additional customer call to dispatch. Hotline is a standard service provided during warranty and is included as part of all maintenance contract agreements.

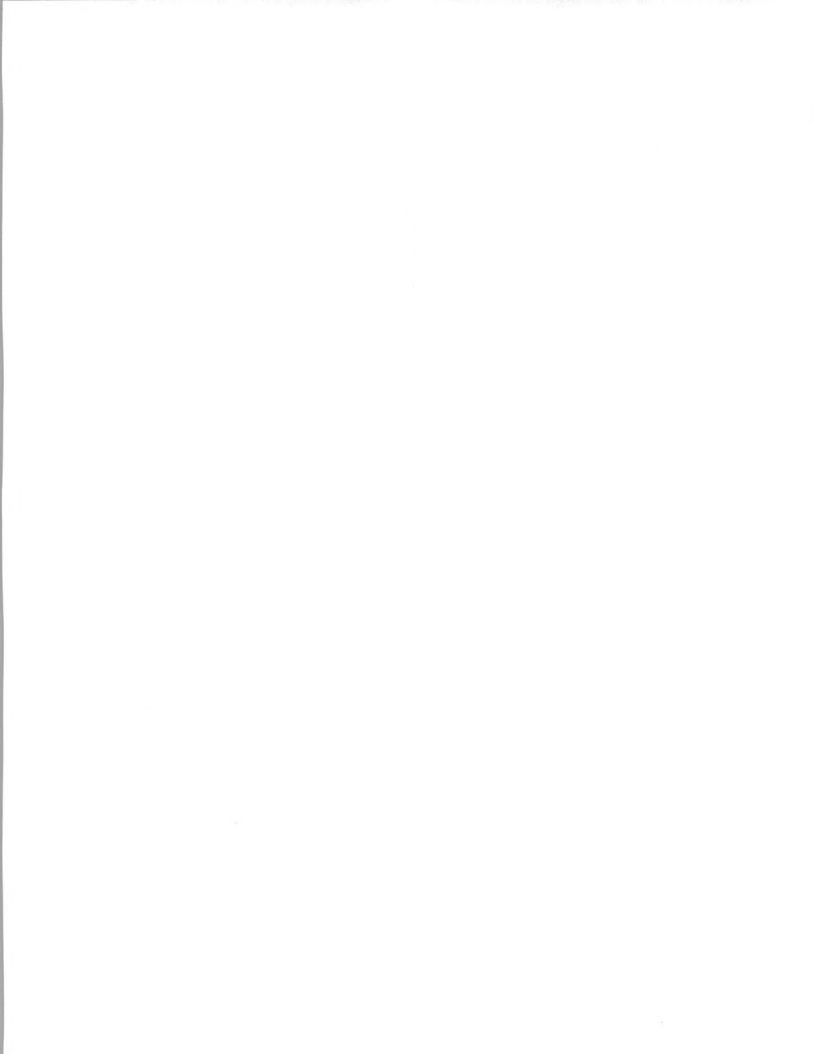
- Business Day Service includes 9-hours-a-day, 5-days-a-week coverage, on-site for both parts and labor. Response time objectives are in the 4-hour range.
- Around the Clock coverage provides 24-hours-a-day, 7-days-a-week coverage for both parts and labor. Response objective for major failures is 4 hours, and for noncritical problems is 24 hours. Requests for response to minor problems outside normal business hours is subject to a premium charge.
- For customers who prefer to be responsible for diagnosis, removal and reinstallation of replacement units, AT&T offers Customer Inventory Management (CIM), a courier service used to deliver replacement units in exchange for an equal number and type of failed units. CIM provides one exchange action per month and requires the customer to maintain an inventory of spare units. All similar items purchased and located at an individual CIM site must have CIM maintenance. Additional exchanges will be provided by AT&T for an additional charge.

Customer on-site exchange, AT&T on-site exchange, and mail-in or depot services are also available.

Custom Maintenance Agreements allow customers to design a service package to match their own unique requirements. Upgraded response times, support for multivendor integrated systems, enhanced service program management and performance tracking, and a dedicated technician are all options which could be pursued within a customized arrangement.

AT&T also offers a complete range of services through and to its resellers, including logistics planning for installation of major networks, site planning and equipment staging, as well as diagnostic testing to ensure correct operation to customer specifications, warranty repair services, custom wiring and cabling services, and invites resellers to tailor support programs to the user's specific needs.

Service PLUS offers network management support activities. AT&T acts as the single point of contact, managing the support activities and providing some diagnosis and/or dispatch.

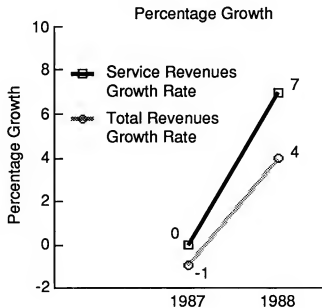
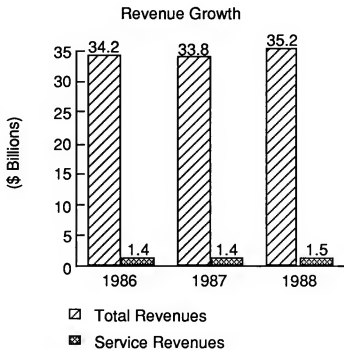


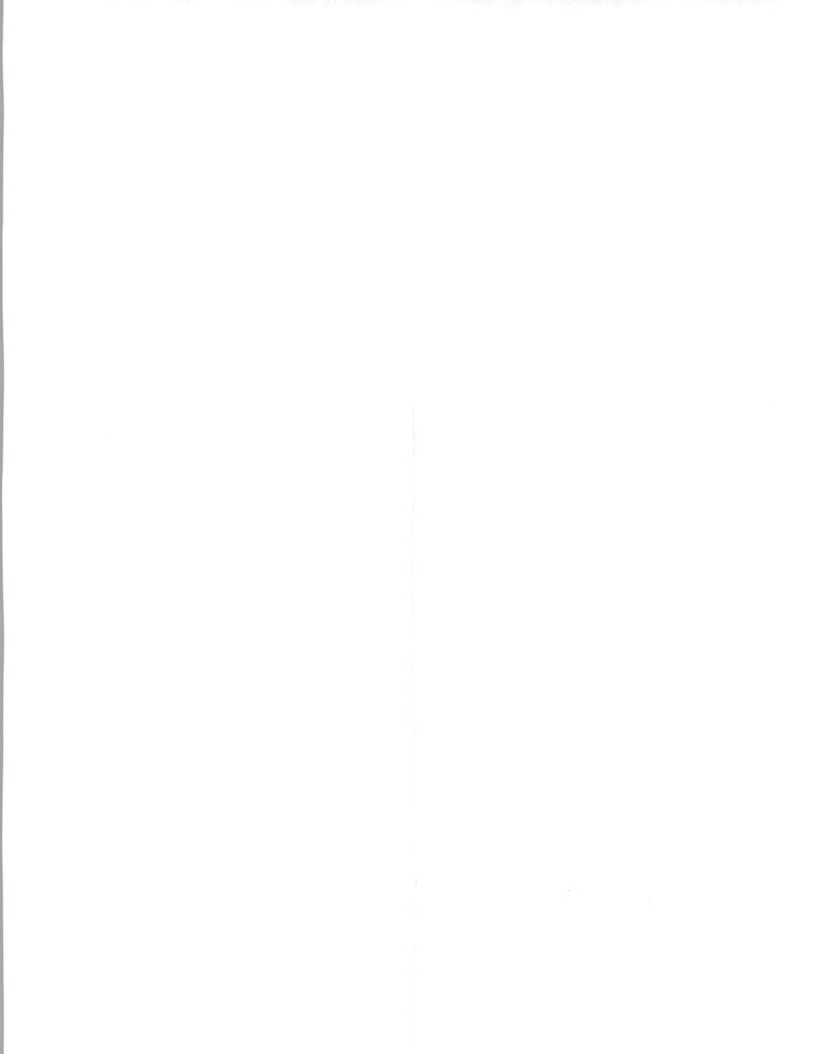
**Strategic
Commentary**

AT&T is relying on the growth of demand for UNIX and “open” systems to carve its niche within the information technology marketplace. The company has lost 17 points of market share to MCI and U.S. Sprint in its long distance businesses, and while that share loss trend may be slowing (perhaps even reversing), price competition will continue to cap revenue growth opportunities. Successes this past year may indicate a turnaround in AT&T’s overall business equipment programs.

AT&T’s customer service programs appear comprehensive, but not leading edge within the service industry.

EXHIBIT II-1

AT&T Corporation's Total Company and Service Revenue Growth



**BULL HN INFORMATION
SYSTEMS INC.**

300 Concord Road
Billerica, MA 01821
(508) 671-6000

Roland D. Pampel, President and CEO
Owen F. Keefe, Vice President,
Customer Service Operations
Total Employees: 18,000
Total 1988 Revenue: \$2,200 million
Total 1988 Service Revenue: \$640 million*
* INPUT estimate

The Company

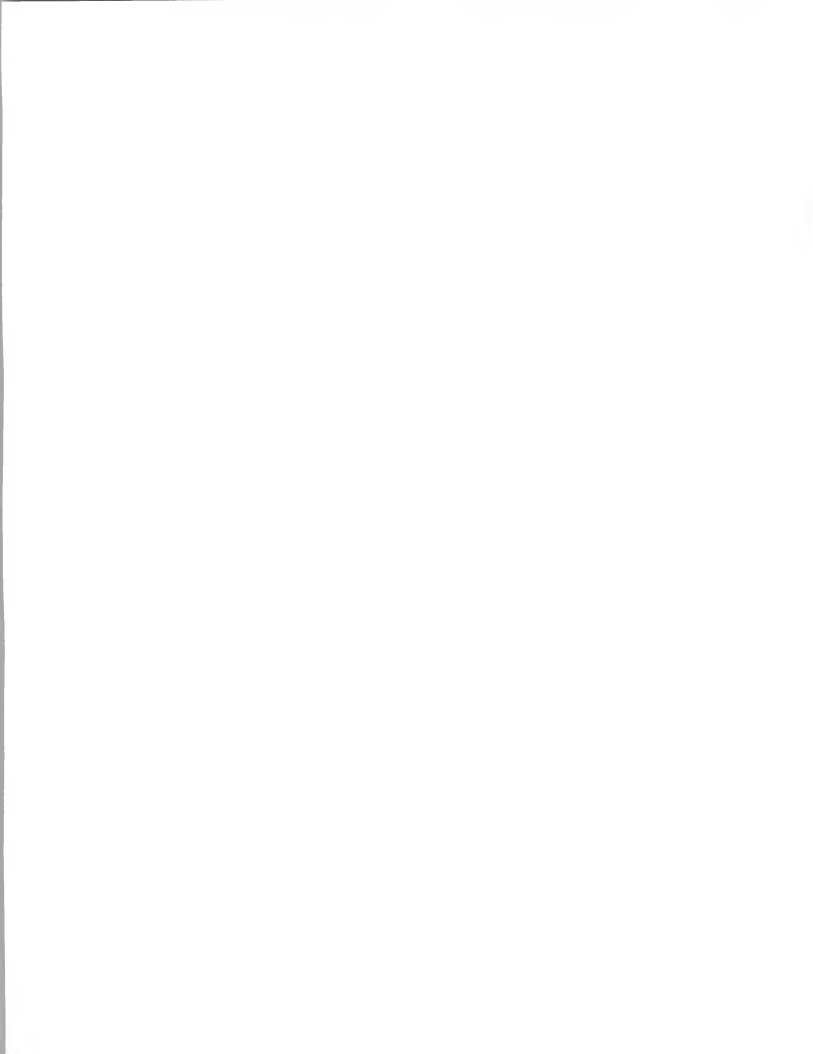
In 1987, Honeywell Inc. sold to Compagnie des Machines Bull, a French corporation, 42.5% and to NEC Corporation 15% of the issued and outstanding stock of its subsidiary, Honeywell Information Systems, Inc. The company was renamed Honeywell Bull Inc., as INPUT reported last year. On December 29, 1988, Honeywell exercised its right to require Compagnie des Machines Bull to purchase an additional 22.6% of the stock, thus reducing Honeywell's interest to 19.9% and increasing Groupe Bull's interest to a controlling 65.1%; Honeywell Bull became Bull HN Information Systems Inc.

Subsequent transactions have raised Groupe Bull's stake to 69.4% and lowered Honeywell's equity to 15.6%.

Bull HN Information Systems is a U.S.-based, worldwide information systems company that develops, manufactures, markets, and sells computer products and systems. Honeywell Federal Systems Inc. markets, installs, and supports data processing systems and equipment acquired primarily from Bull HN Information Systems, Inc.; HFS' primary customer is the U.S. government, and HFS is Bull HN's marketing arm to this business segment.

The combined revenue base of the Groupe Bull family is more than \$5.2 billion, ranking Groupe Bull as one of the 10 largest information technology companies on a worldwide basis today. Bull HN's sister company is Bull S.A., a European-based company in which the French government still has a majority interest. Relationships between NEC, Honeywell and Compagnie des Machines Bull date back to the early 1960s.

In October 1989, Groupe Bull and Zenith Electronics announced an agreement under which Groupe Bull would acquire Zenith Data Systems and Heath Zenith. The \$1.4 billion (revenue) Zenith electronics operation is planned to be managed as a separate entity under Bull HN Information Systems, giving Bull HN a 7% market share among commercial PC users and a major presence in the laptop and portable PC market. Bull HN has been a major OEM customer of Zenith, and Zenith has been especially strong in the U.S. government business sector. Stockholder approval of the transaction was expected by year-end 1989.



Service Demographics

Bull HN's U.S. marketing, sales, and service operations employ about 8,900 in total. Of these, approximately 2,300 are service employees working from approximately 195 different locations, several walk-in or mail-in repair centers and 60 parts distribution "clusters." Slightly less than 50% of the U.S. service workforce are "traditional" CEs with hardware maintenance responsibilities.

INPUT estimates that Bull HN's U.S. service revenues are about \$315 million, which would place the company in the U.S. at a profitable \$137,500 revenue per service employee. More detailed information is not available due to the "closely held" nature of the company.

Bull HN's National Response Center in Atlanta, GA, is accessible 24-hours-a-day, 7-days-a-week by means of a toll-free number; the NRC provides central dispatch and maintains a problems-resolution data base containing the complete equipment service and performance history of every Bull HN customer. Three Technical Assistance Centers (TACs) provide on-line remote diagnostic support for customers and CEs on selected systems. TAC center personnel also provide verbal technical assistance to CEs when on-site resolving problems.

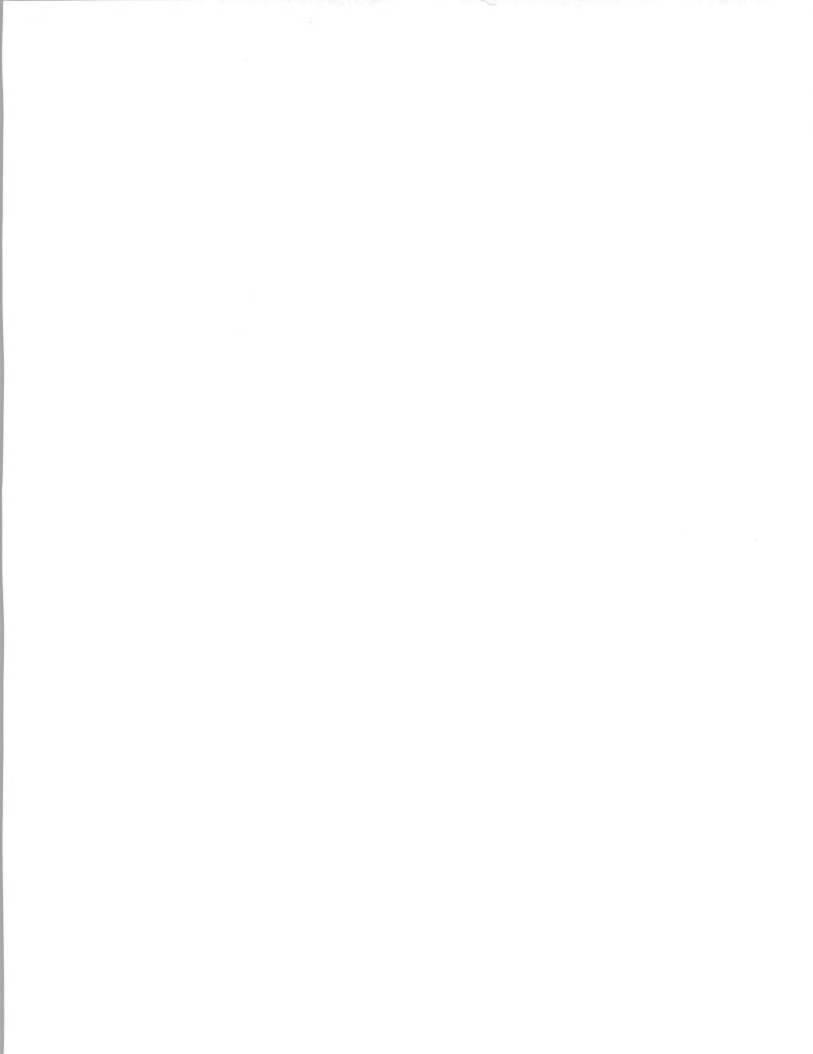
Bull HN has indicated the acquired Zenith Data Systems (ZDS) business will continue to operate as a separate unit. ZDS employs about 4,000 people, and its 1988 service revenues were about \$60 million, up 31% from the previous year.

Service Delivery

Bull HN's standard hours of coverage are "normal" business hours, Monday through Friday. Response times may be either commitments or goals, depending upon the contract with the customer, and range from four hours for PC and workstation products to two hours for large and midrange systems users.

Bull's program of comprehensive services is referred to as TotalCare Service. The company advertises hardware, software, and network support; remote, on-site, and customer-assistance maintenance programs; and logistics and customer training—all of which are managed through or by the National Response Center as the hub. The company has incorporated artificial intelligence into the diagnostic process for CEs to use prior to arriving at a customer site.

Bull HN's offerings include guaranteed response-time credits, preventive maintenance during scheduled extended maintenance periods, equipment installation, ECO installation, and equipment malfunction protection credit.



Bull HN also offers TotalCare TPS (third-party service) for network and peripheral products from more than 50 different manufacturers. All of Bull's standard and customized service programs apply to its third-party support effort.

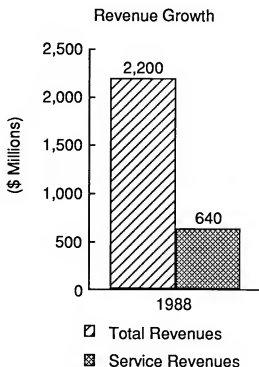
Strategic Commentary

Bull HN's service programs are comprehensive and profitable. The last year seems to have been dedicated to internal matters necessitated by the change in corporate ownership late in 1988—there has not been a steady stream of service announcements from Bull that have been characteristic of several other companies in this market.

INPUT believes that the company had already integrated the various service functions involving hardware, software, data communications and network support, and will focus its efforts during the coming few years on improvements and refinements rather than spectacular activities.

EXHIBIT II-2

Bull HN Information Systems Inc.'s Total Company and Service Revenue Growth



Percentage Growth (N/A—First year)



CONCURRENT COMPUTER CORPORATION

106 Apple Street
Tinton Falls, NJ 07724
(201) 758-7500

James K. Sims, Chairman, President
and CEO
Michael J. Stelzer, General Manager,
Customer Services
Total Employees: 3,446
Total 1988 Revenue: \$ 339.5 million (7/31/88)
Total 1988 Service Revenue: \$106.2 million*
* includes other operating revenue

The Company

On September 27, 1988, Concurrent Computer Corporation was formed out of the former Massachusetts Computer Corporation (\$76 million revenue), and the former Concurrent Computer Corporation (\$263 million revenue), which had been controlled principally (81.5%) by The Perkin-Elmer Corporation.

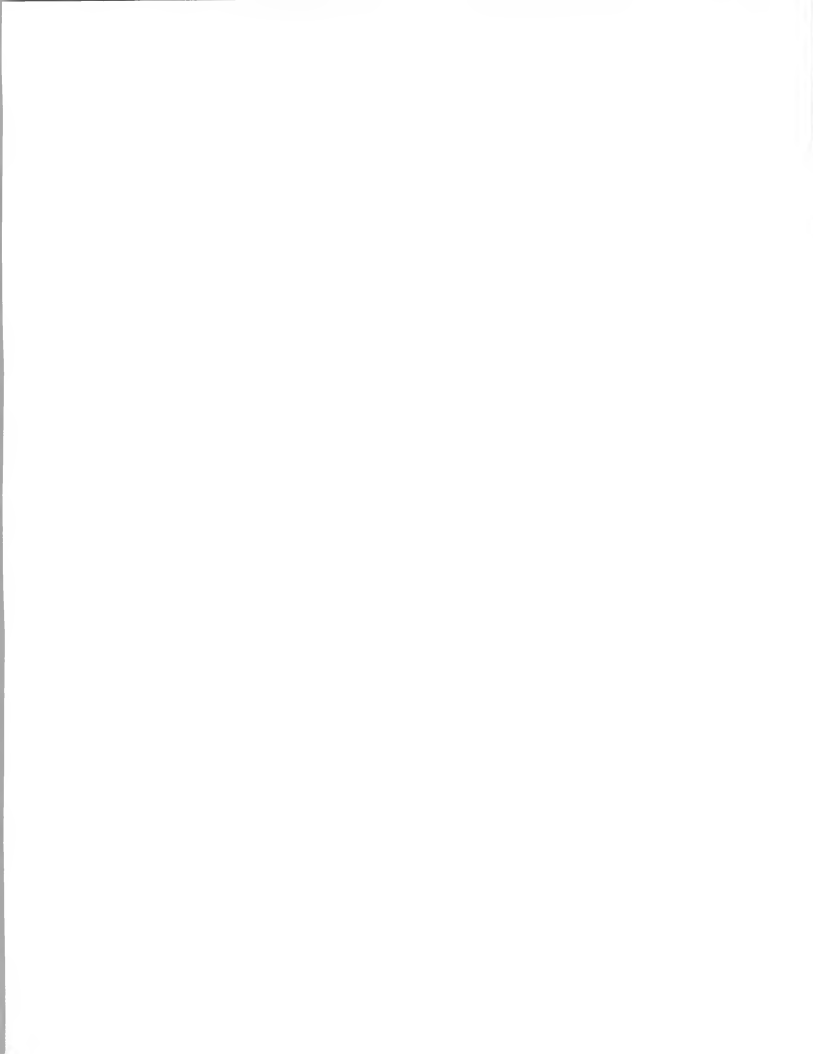
Combined FY 1988 (fiscal year ends July 31) total company revenues were \$339.5 million, of which \$106.2 million was from services. FY 1989 was about the same—total revenue was \$337.1 million on a pro-forma basis, of which service contributed \$109.2 million. Total headcount at the close of FY 1989 was slightly over 3,000. About \$63 million in service revenue was derived from U.S. operations, and the remaining \$46 million was derived from international business.

Concurrent focuses on 32-bit digital computer systems designed primarily for time-critical applications, providing fast performance and real-time event responsiveness, high volume I/O capability, easy expandability and high reliability.

Low to midrange performance requirements are satisfied by systems developed by MASSCOMP; the product line ranges from a board-level computer to a multiprocessing system 30 times more powerful. Upper limits of midrange systems are addressed by products from the former Concurrent Corporation, with processing capabilities in the 1 to 33 MIPS range.

Real-time applications include aerospace training and simulation, on-site seismic data collection and processing for mining and petroleum industries, air management and weather systems, and engineering data acquisition and control. On-line applications include financial services, financial planning, wagering, production scheduling, project management, inventory tracking and distribution, and specialized commercial data processing.

On March 6, 1989, Concurrent and General Microelectronics Corp. (GMIC) jointly announced formation of a jointly owned corporation to develop hardware and software for a new family of parallel



supercomputer systems. The new company, Supercomputing Solutions, Inc. (SSI) is targeting applications in computational fluid dynamics, computational chemistry, large-scale simulation and electromagnetic analysis. NASA will be a potential user of the new products.

In May 1989, Concurrent announced formation of a new division focused exclusively on systems integration and customization of its real-time products for its traditional markets. In addition, the group will develop or integrate ruggedized systems and integrate third-party software for complete custom solutions. Examples of projects which might be the responsibility of the new division are an upgrade to NASA's space shuttle simulator systems, and the Next Generation Weather Radar project (NEXRAD) on which Unisys is prime contractor for the radar equipment.

Service Demographics

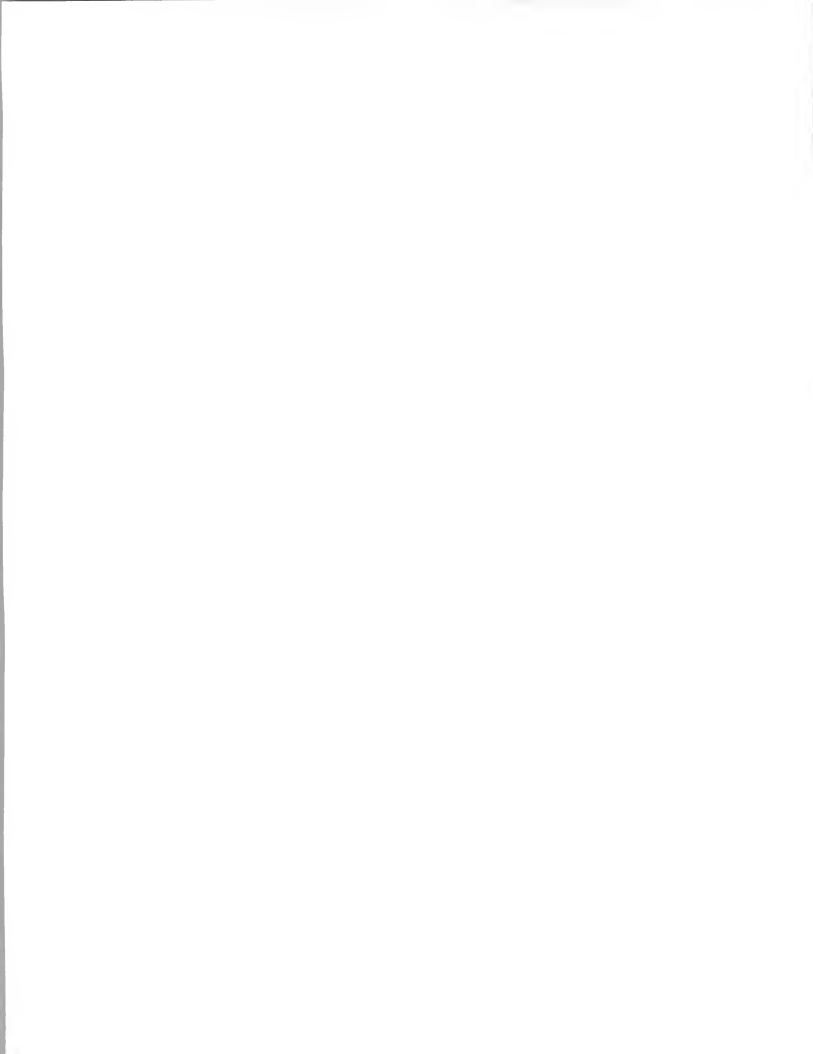
On a worldwide basis, Concurrent employs about 900 service personnel, of which 550 are CEs and another 100 are software support specialists, working from 70 locations within the United States and 50 locations overseas. Approximately 55% of service headcount is dedicated to U.S. operations. In addition, Concurrent employs 10 network specialists. Parts repair and distribution is managed through one central facility in the United States and three facilities within international operations.

Service Delivery

Concurrent offers service and support programs for both hardware and software products, including contract service for selected third-party equipment. Programs offered include technical and business consulting, spare parts sales, rentals and exchanges, diagnostic services, resident service, preventive maintenance, and customer training/education.

Service offerings for self-maintaining customers fall into four categories:

- Product Repair Service is geared to the needs of users who maintain the majority of their own system components. This program is charged on a flat rate basis, depending upon which assembly, peripheral, modules or third-party add-on is involved. An option to receive module updates and installation of the latest revisions is available as part of this program.
- Full maintenance provides the user with on-site support for both hardware and software, along with software updates and telephone support. The plan is flexible enough to accommodate different periods of maintenance coverage and expedited response to service calls if desired.
- The FASTBACK Module Repair program helps completely self-maintaining customers meet their sparing requirements through



guarantees of 10-day turnaround on module repairs and expedite air freight returns. Parts leave the Concurrent facility fully tested and warranted for 90 days.

- The Emergency Exchange Service assures expedited shipment of critically needed assemblies. Replacement parts installed with the most current revision level are shipped to user sites and also warranted for 90 days. Users call the National Logistics Center with their requests, and parts are located and shipped on the same day.

Concurrent provides three separate contract plans for more traditional maintenance support. Contracts include the following:

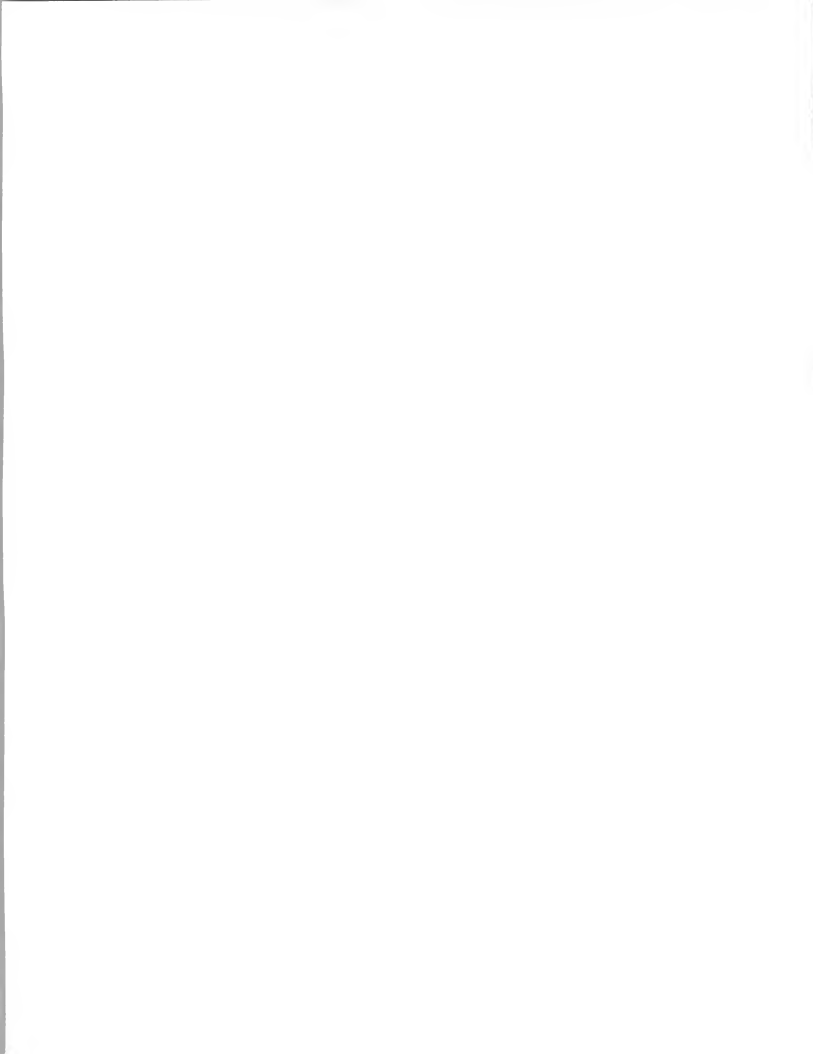
- Primary Service supplies users with unlimited access to a hardware support hotline through Concurrent's Technical Assistance Center, as well as on-site support during chosen hours of coverage. Response times and preventive maintenance are also tailored to suit customer needs.
- Comprehensive and Comprehensive-Plus plans provide users with critical application a 95% or 98% uptime guarantee, backed by a premium refund agreement in the event of missed commitments. On-site hardware and software support is provided as needed, with response times guaranteed at either two hours or four hours, depending upon the definitive contract negotiated.

Software supports options are also varied, depending upon customer needs and budget:

- Comprehensive Support includes toll-free telephone support from Concurrent's National Support Center in Oceanport, NJ, on-site support when necessary, access to remote diagnostic and repair technologies, along with automatic updates, revision and changes to software and related documentation. A software Subscription Service alerts users to upcoming changes and current field information is also included.
- Extended Software Maintenance supplies the essential software update and revision service, and a subscription to Concurrent's software publication and documentation updates. Telephone hotline assistance can be added to provide any required backup to users who maintain their own software.

Concurrent offers software support components on a unbundled basis, so that users can build a unique software support program tailored for their particular needs.

The company's standard response time for hardware service is eight hours, although two and four hour programs are available.



**Strategic
Commentary**

Concurrent has spent a great deal of its collective attention during this past year at completing the integration of the two entities which were brought together during 1988. During this period, it has successfully merged MASSCOMP offerings with the Concurrent offerings already in place, for a comprehensive service program.

Like other "smaller" organizations, as hardware reliability continues to improve and reduce the need for in-site hardware repair, Concurrent will be faced with how to develop alternate sources of service revenues to maintain a field presence economically. The company has recently reorganized responsibilities for service revenue growth, integrating new service business with sales department revenue quotas so that field sales personnel may achieve their objectives through a combination of product and service business.

The company is expected to introduce additional services in 1990, including a more aggressive multivendor support program.

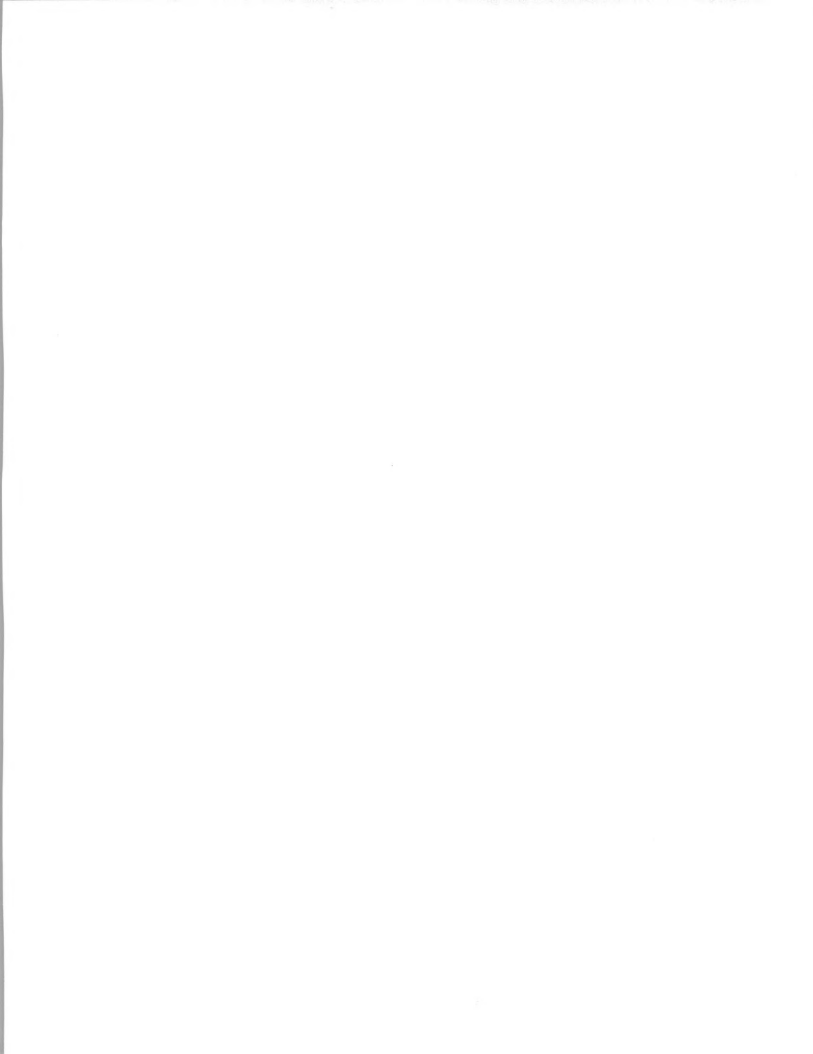
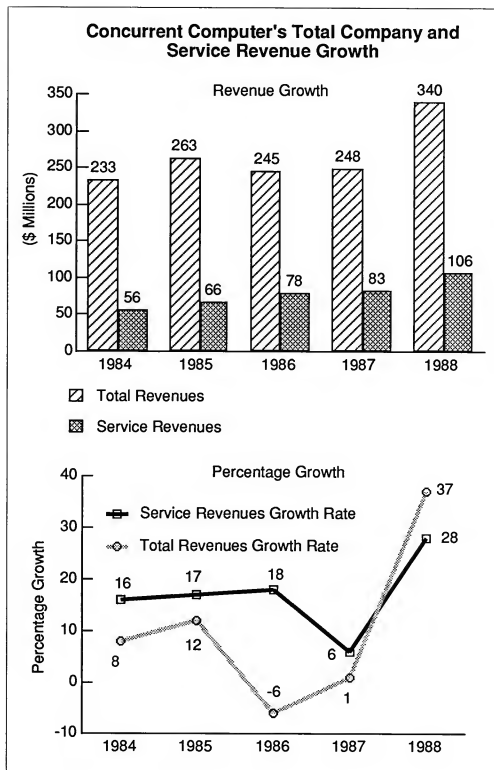
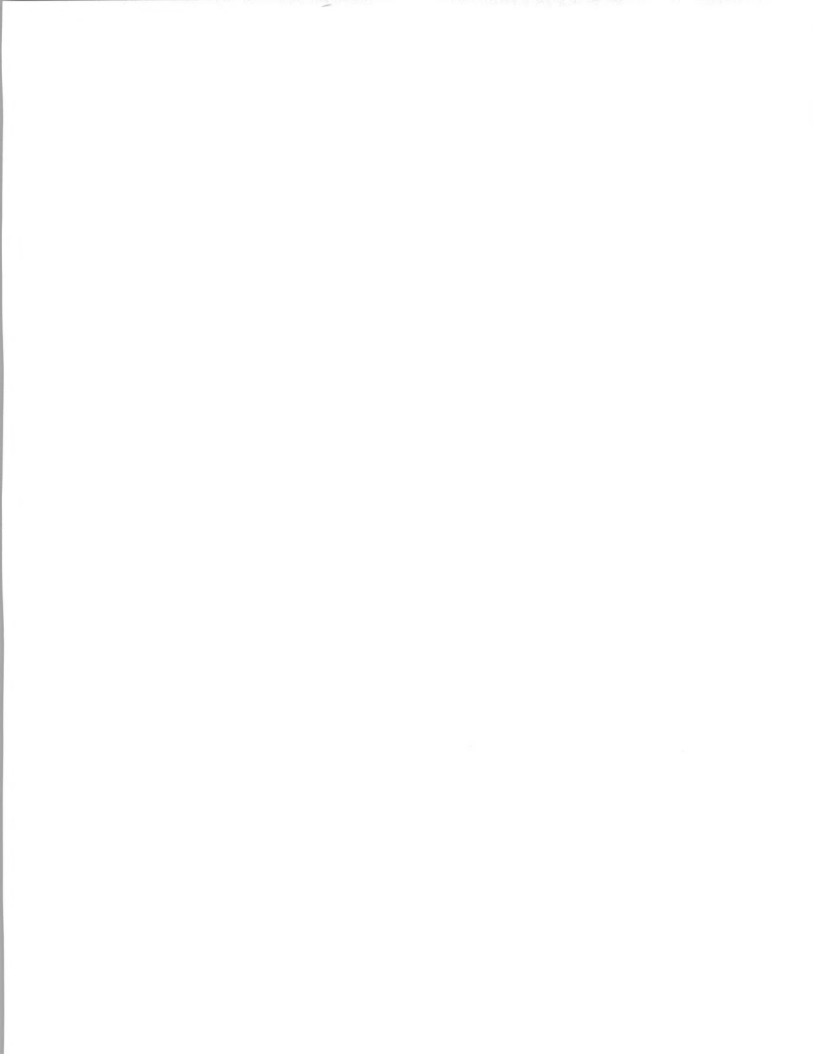


EXHIBIT II-3





DATA GENERAL CORPORATION

4400 Computer Drive
Westboro, MA 01851
(508) 898-4861

Edson D. de Castro, President and CEO
Dr. Michael Schneider, Senior Vice President,
Customer Services Division
Total Employees: 15,420
Total 1988 Revenue: \$ 1,365 million (9/31/88)
Total 1988 Service Revenue: \$450.9 million

The Company

Founded two decades ago, Data General Corporation (DG) designs, manufactures, and sells general purpose computer systems and provides peripheral equipment, software, communications systems, and related products and services, including training and maintenance. Data General has installed more than 250,000 computer systems worldwide.

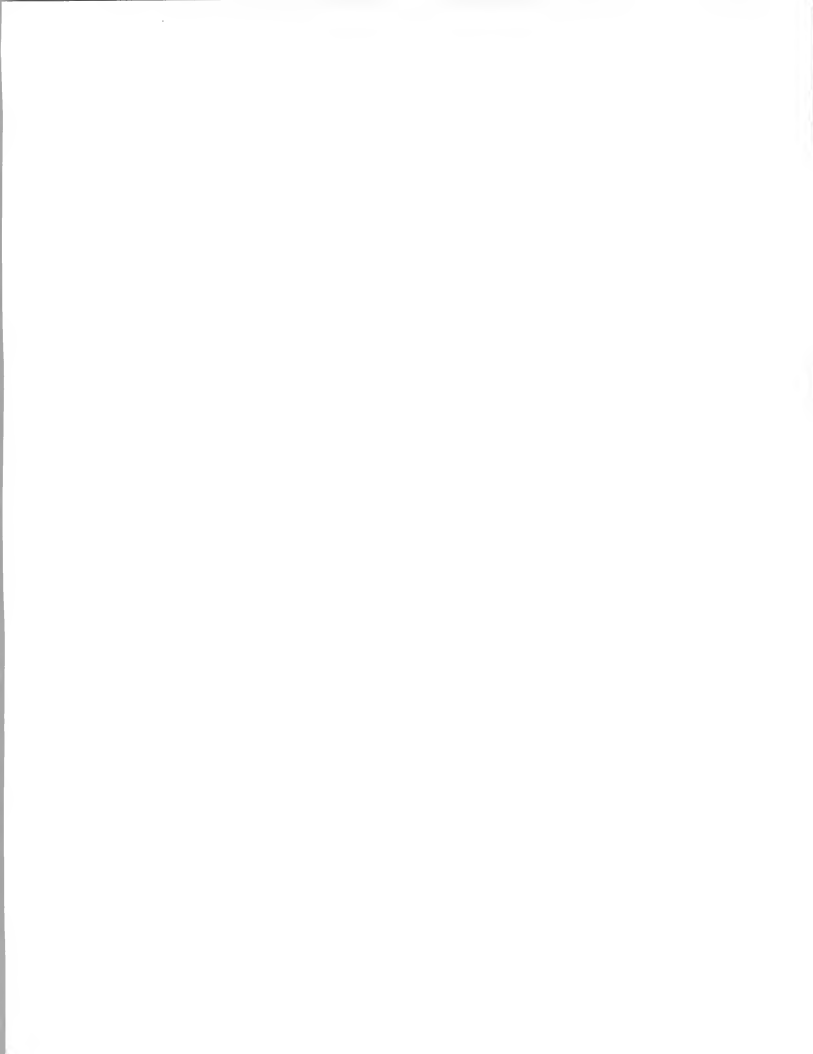
In 1988, total revenue grew at a modest 7.1% compared to 1987, better than the prior year (in which revenue growth was flat), and at a rate industry analysts feel is typical for a mainframe computer vendor. Costs of operating the business grew at a slower 3.2% rate before special charges for restructuring, so progress was made in achieving a better balance between sales and operating expenses.

In October 1989, the company announced that FY 1989 revenue would be about \$1,314 million, down slightly from FY 1988, but fourth-quarter sales were the highest in the company's 21-year history. The company continues to operate at a loss, however, and 1989 results will probably be unprofitable even before considering special restructuring charges. Fourth-quarter results were a \$84.1 million loss, most of which was due to one-time charges.

Approximately 51% of the company's revenue is generated within the U.S. DG works with VARs, OEMs, and independent software and hardware vendors to sell product and support services. In 1988, product revenues were almost equally balanced between DG direct sales and sales through alternate distribution channels.

Headcount at the end of FY 1988 was down modestly (15,420 versus 15,685 the prior year), but 1989 announcements indicate plans to further reduce manufacturing, headquarters, sales, R&D, and field operations, by a total of 2,200 during FY 1989 and FY 1990. The worldwide customer services headcount seems to be higher this year compared to last (1,910 currently versus 1,500 according to a previous INPUT report), but the most recent figures also include internal restructuring which added customer education and software support responsibilities to Customer Service Division's charter.

DG's revenue per service employee seems to be one of the highest in the industry, at \$236,087, possibly an indication of inordinate pressure on the service organization to improve productivity and at the same time



increase or maintain quality of service. Service revenue grew in FY 1988 at a modest 6.4%; gross profit from services improved a full 4 points, highly unusual in the competitive environment seen this past year.

Reports are that FY 1989 services revenues are beginning to decline, year-to-year. For the period ended June 30, quarterly service revenue slipped from \$114 million the previous year to \$108 million; and for nine months revenues declined to \$330 million from \$341 million.

Service Demographics According to INPUT estimates, Data General employs approximately 1,200 service personnel in the U.S., of which 800 are CEs working from 68 different service locations in this country. DG operates a central Customer Support Center in Norcross (GA) and logistics and repair centers in Fountain (CO), England, and Australia.

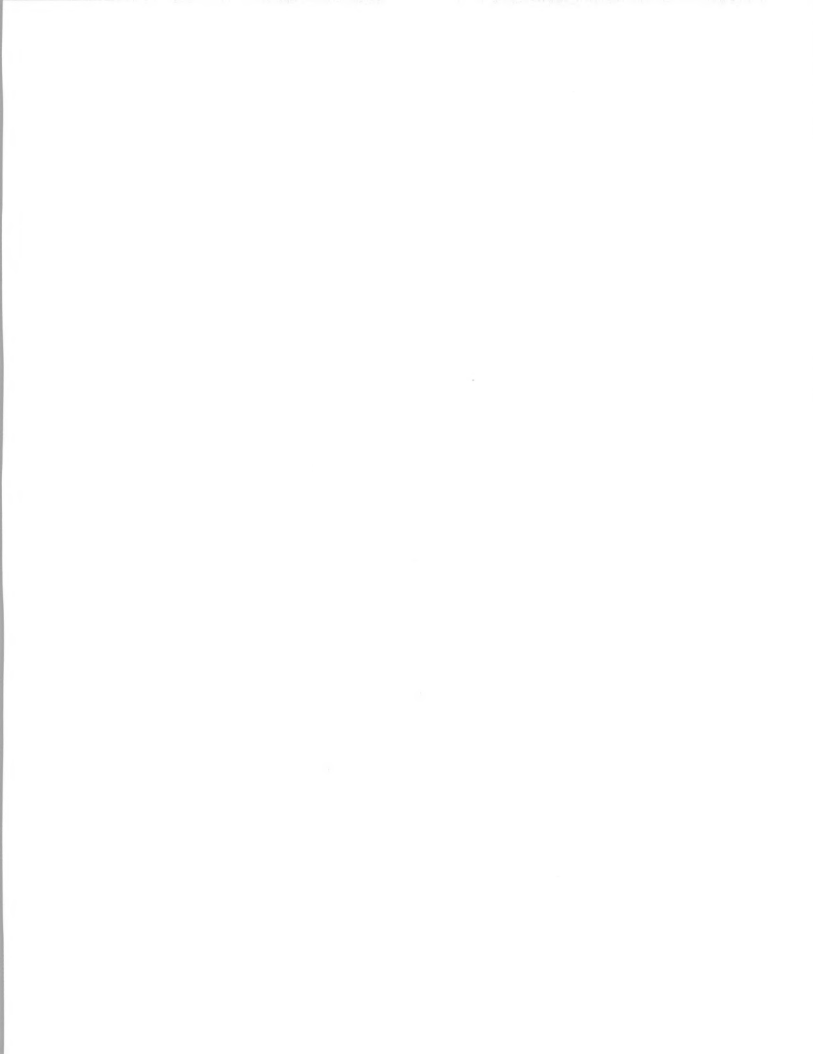
DG has a tradition of distribution and service support through resellers, which has apparently over time fostered a competitive independent third-party service thrust which DG has not supported since 1986. The company has litigated (somewhat successfully) during the past two years over its rights to proprietary Adex diagnostic software, and one of its marketing brochures points out the advantages of using DG service relative to competitive service vendors.

DG has added a Customer Service Telemarketing program, called DG/DIRECT, to facilitate sales of maintenance and related supplies and accessories, including terminals, PCs, peripherals and power conditioning systems for its Compatible Products Program.

Service Delivery Data General offers a comprehensive series of service programs aimed at direct support of end users as well as support for products sold through alternate distribution channels. Reorganization of customer service to include education and software support has facilitated offerings which combine hardware and software support into a single service product. Specifics of the major programs are detailed in the following paragraphs.

Aimed at obtaining firm customer commitments for up to five years, DG introduced Multiyear Plus in late 1988. Along with price protection for the contract term (the CPI must increase 25% or more from the index published during the first year of the contract, before prices may be increased to a limit of then-current published rates), customers earn a 5% discount in the second year, and a 10% discount during the third and subsequent years of their contractual commitment.

Customers may tailor their Multiyear Plus programs to include Extended On-Site coverage (up to 24 x 7), Enhanced On-Site Response (two hours), Maximum Uptime Service, Multi-Terminal Deferred



Maintenance, Critical Response Service, and a Resident Field Engineer Program. Normal on-site response time by a CE is targeted at four hours.

During FY 1989, DG introduced Integrated Service Program (ISP). Available as an option under a variety of DG maintenance contract programs, ISP bundles hardware and software support under a single umbrella and provides one-call coordinated service delivery. ISP Plan 1 includes toll-free telephone support for three designated callers; remote software support and automatic distribution of software updates or revisions; a copy of updates or revisions to software and documentation; and Right-To-Copy, which permits use of software and related support on an additional CPU not already covered by these services. ISP Plan 2 includes all of Plan 1 benefits, but the approach is a monthly license fee rather than one-time license fees provided under Plan 1.

Pricing for combined hardware-software support programs include discounts between 10 and 25% from customary software support charges, when combined with DG hardware service agreements.

DG's support center is available for hardware and software support around the clock, seven days a week!

In response to customer demands for single source service in a multivendor environment, DG announced in July 1989 a Compatible Products Program, which extended all of DG's service offerings to its customers who may be utilizing more than 100 different products from approximately 20 alternate vendors. Products from manufacturers such as Fujitsu, Printronix, Diablo, NEC, Data Media, Control Data, Texas Instruments, Hewlett-Packard, Genicom, Datasouth, Epson, Okidata, Cipher, and, of course, IBM are supported when installed in a DG hardware environment. DG invites customers to inquire about products or manufacturers not already on the list of supported items, and suggests the "turn on" date for service of non-DG products is "generally 60 days after we receive your order."

In October 1989, DG introduced CustomNet, which offers users support in planning, designing, installing, integrating and maintaining networks. DG will resell third-party products such as bridges, modems, routers and gateways; coordinate and manage site preparation and cable installation; provide on-site repair service and telephone support for software for approved third-party products; help users consider geography, building type, projected volumes and growth, needed reliability and security as part of the network design process; and manage implementation of LANs or WANs including supervising integration of all DG and third-party hardware and software. Due to the variety of circumstances which may be encountered, the program is offered on a custom quotation basis only.



For customer-maintainable items, DG offers Spare Mail, an exchange and repair service for DG spare parts. Three levels of support are provided—emergency, next-day delivery, and three-week turnaround. All options include installation of the latest ECOs on the assembly unless otherwise desired by the customer.

In July 1989, Data General updated its VAR Service Programs, VAR Service Seller and VAR Service Manager. Both programs are oriented toward providing DG support services in concert with the VAR for maximum customer satisfaction and flexibility. A VAR's participation is limited to one program or the other at the same time, however.

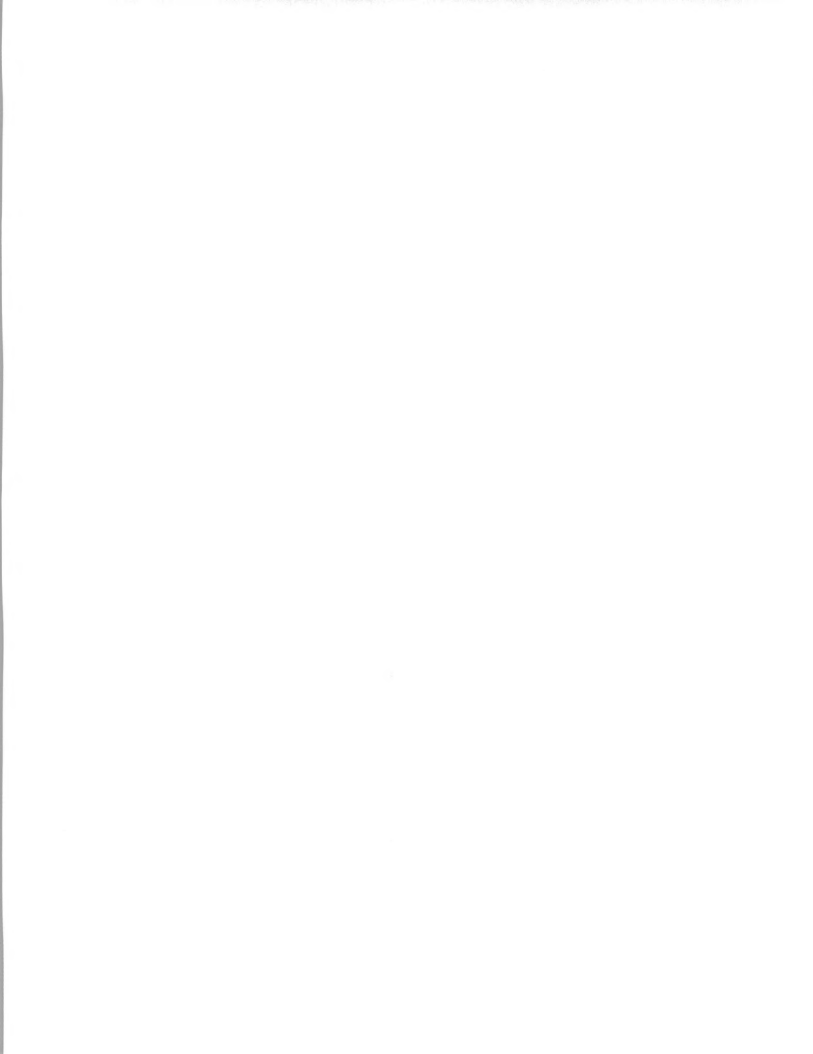
VAR Service Seller provides a one-time, first-year sales commission of either 4% or 10% of the initial annual billable amount of DG maintenance sold to the end user. The VAR is supplied with selling literature and sales support, and his involvement is finished once contract paperwork is received by DG for processing.

The VAR Service Manager program makes the VAR a reseller and first-line support organization, and it has a \$100,000 per year maintenance contract revenue base minimum associated with continued VAR participation. The VAR Service Manager must maintain a central help desk through which all its customers' initial calls are placed and screened and must accept direct invoicing and payment responsibility. Of course, this provides the VAR Service Manager an excellent opportunity to provide a complete, turnkey installation and ongoing support proposition in which the VAR retains account control. The VAR Service Manager can earn discounts from DG's normal maintenance of between 5 and 15%. VAR Service Manager involves a three-year commitment to the program by the VAR electing this option.

The full range of Data General service offerings and programs are available for the VAR to use with both Service Seller and Service Manager. The programs are applicable to all new installations, all currently installed systems which have not been covered under DG maintenance contract during the preceding 12 months, and certain other maintenance contract sales for other DG systems set forth in the VAR's specific reseller agreement.

Strategic Commentary

Customers of Data General's new ECLIPSE MV/40000 and MV/40000 HA systems and the Message-based Reliable Channel subsystem receive a one-year warranty which includes 24 x 7 service coverage, round-the-clock support from the Norcross Customer Support Center, and an account team dedicated to this class of system. Customers have use during the warranty period of DG proprietary software which permits on-line diagnostics to be run from the CSC, just as if they had an Extended Maintenance contract.



Data General's in-house customer satisfaction surveys, conducted quarterly, show a significant and steadily growing improvement in user satisfaction with both its hardware and software service and support.

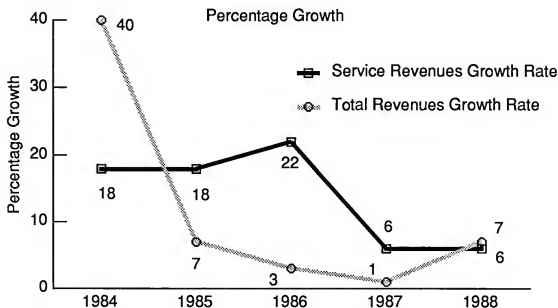
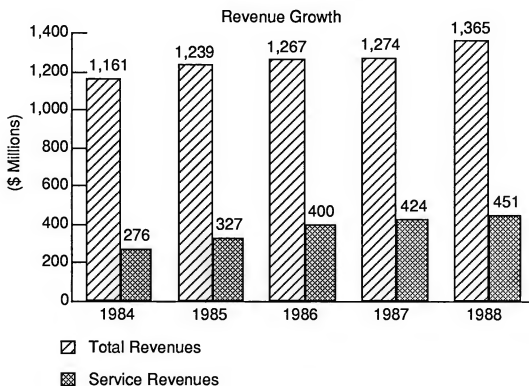
From this point forward, service revenues from conventional sources (i.e., DG hardware products) are likely to stabilize or even erode some more. The company's prospects for added business due to providing maintenance on third-party products is promising, and the company is also optimistic about service opportunities in support of integrated LANs and WANs.

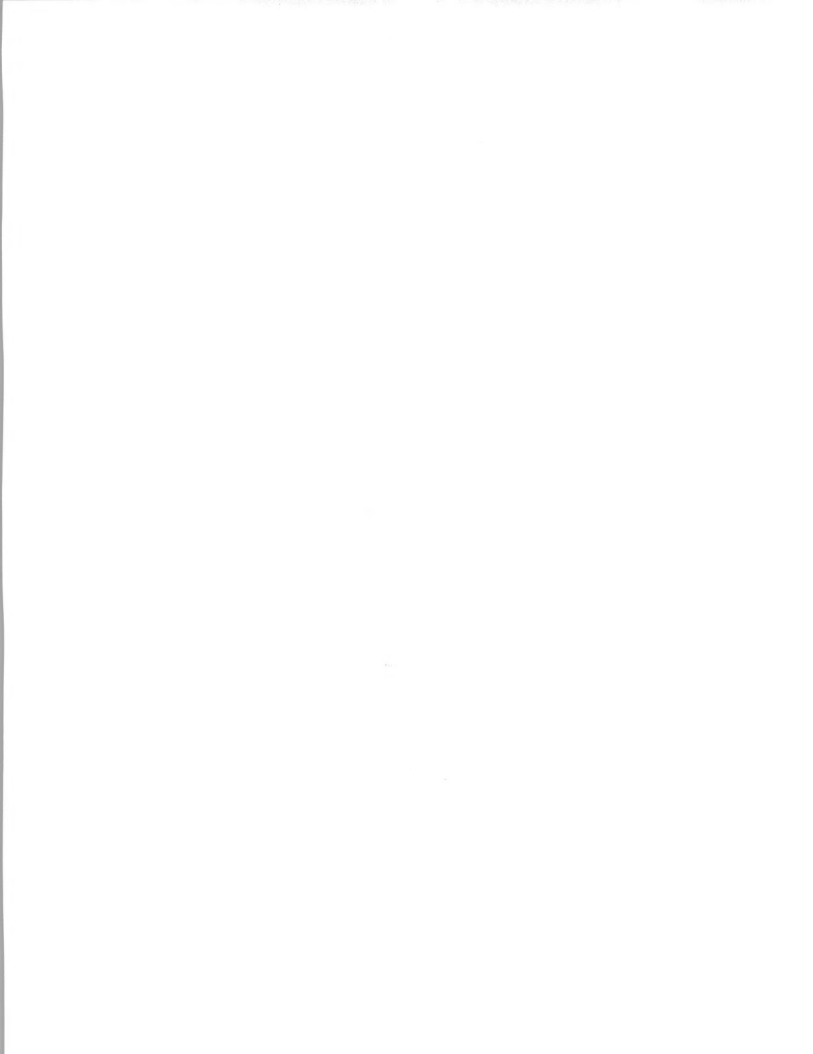
The challenge for DG, as for others (except perhaps IBM), will be to maintain a sufficient presence in the field so that responsiveness and quality of service do not suffer and to implement additional central support tools and procedures to continue to improve customer satisfaction without impairing profit margins.



EXHIBIT II-4

Data General Corporation's Total Company and Service Revenue Growth





DIGITAL EQUIPMENT CORPORATION

146 Main Street
Maynard, MA 01754-2571
(508) 493-5111

Kenneth H. Olsen, President and Director
Donald P. Zeretski, Vice President, Corporate Customer Services

Total Employees: 125,800 (7/31/89)

Total Service Employees: 41,250 (7/31/89)

Total 1989 Revenue: \$12,700 million (7/31/89)

Total FY 1989 Service Revenue: \$4,552 million*

* includes maintenance, software support, consulting services, customer training and repair parts.

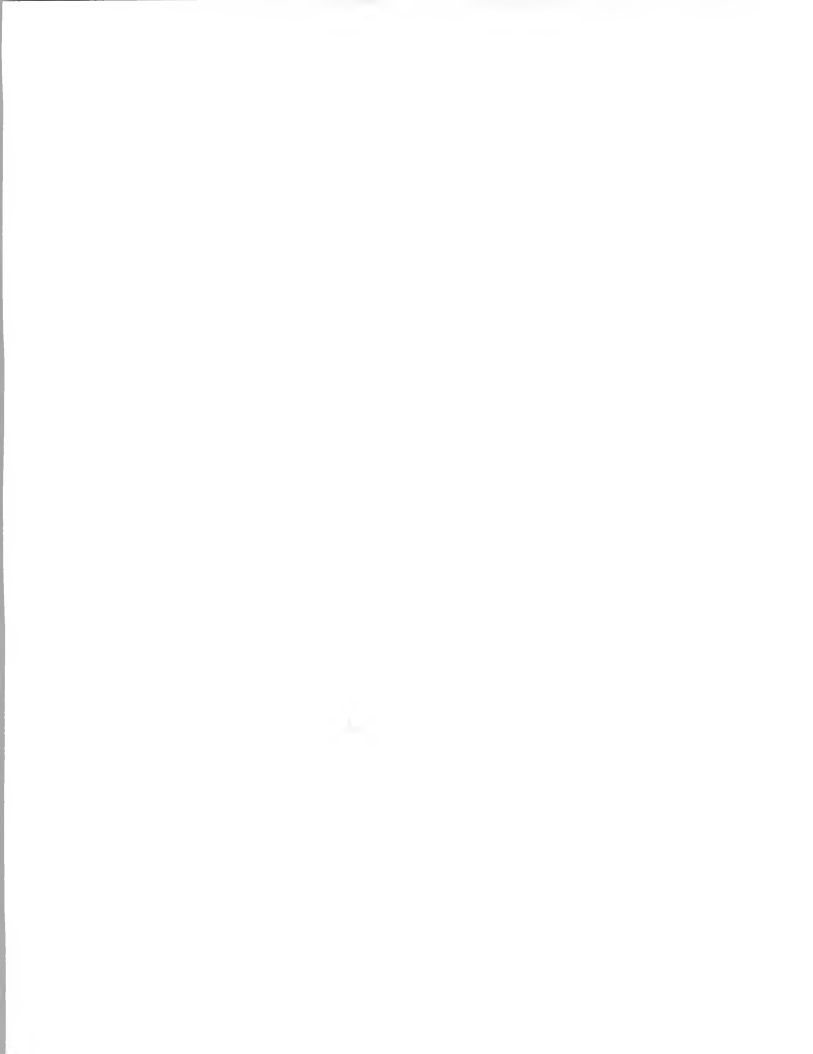
The Company

Digital Equipment Corporation (DEC) claims to be the world's leading manufacturer of network computer systems and associated peripheral equipment, and the leader in systems integration with its networks, communications, services and software products. Digital's VAX computer family integrates the enterprise, from the individual and work group, to the whole organization. DEC's products are used in a variety of applications and programs, including scientific research, computation, communications, education, data analysis, industrial control, timesharing, commercial data processing, graphic arts, word processing, personal computing, health care, instrumentation, engineering and simulation.

Digital is one of the founders of the Open Software Foundation (OSF), and is participating in development of OSF User Interchange Standards. The company is committed to meeting all information interchange standards.

Unlike many other multibillion-dollar firms in the technology industry, DEC revenues and earnings have grown significantly over recent years. Revenue in FY 1989 was 21% greater than FY 1988, and FY 1988 was 12% better than FY 1987. Services grew significantly during this timeframe: 18% in FY 1989 and 26% during the prior year. Cost of services has grown a point or two less than revenue, yielding improving margins on this major segment of the business; DEC enjoyed a 38.3% gross profit margin from the service segment during FY 1988 and this improved to 39.1% in FY 1989.

In September 1989 the company offered a voluntary severance program to 700 manufacturing employees, and in June disclosed a plan to begin shifting 4,000 to 6,000 manufacturing and administrative workers to customer service and sales. DEC has a long history of avoiding layoffs, but has been operating under a quiet hiring freeze in the U.S. for a number of months; department heads within corporate support units are under instructions to cut budgets by 10% this year, and reduce staff by 25% during the next two years. All of DEC's 4,300 headcount expansion during FY 1989 has been in international operations, where business continued to be strong.



Service Demographics

Digital Equipment Corporation employs approximately 41,250 service personnel worldwide, operating from 450 different support locations within more than 60 different countries. According to INPUT estimates, the U.S. customer service workforce is approximately 23,500 strong. The company maintains about 115 different U.S. repair and/or exchange centers for parts and replaceable units.

Approximately 28,000 hardware support personnel are employed worldwide within the field service group, another 8,750 professionals are responsible for software support and consulting services, while 4,500 people develop and deliver customer and employee training on DEC products and services.

DEC offers telephone and remote diagnostic support from 14 Customer Support Centers (3 of which are in the U.S.), which employ approximately 1,300 technical support specialists. The largest center, in Colorado Springs, CO, occupies 50,000 square feet of floor space, employs 500 people, and includes a 30,000 square foot laboratory where DEC technicians can recreate and resolve system interruptions remotely. The Colorado Springs center can take software dumps over telephone lines, analyze the data, develop or suggest corrective action, and transmit back patches to resolve problems. The center will also coordinate or manage the resolution of problems created in a multivendor environment in which DEC is a key element.

Service Delivery

DEC offers a wide range of support services to users of its systems. For hardware maintenance, most users choose between BASICService, which provides next-day response to any hardware failure which occurs during normal business hours, and DECSERVICE, a premium level which provides 4-hour response to hardware failures that occur during the same normal business hours (8-5, Monday through Friday). Two hour response is provided on VAX 8XXX products, and users may upgrade to 24-hour, 7-days-per-week coverage with either BASICService or DECSERVICE.

After the warranty period, DEC OS and DECNET software customers can choose between two major contract offerings:

- The Basic System Support (BBS) offering provides a license to use new versions of OS and DECNET as well as the use of Digital's Software Information Network (DSIN). It also provides telephone support and on-site support with no guaranteed response time.
- The DEC System Support (DSS) offering provides the same services except the response time is guaranteed. Usually it is four hours, but it depends on the location. It also provides escalation to Digital's international resources if required to resolve a problem.



Layered software product customers can subscribe to Software Support Service (SSS) after the warranty period. This service entitles them to a license to use new versions of layered products, the use of DSIN, telephone support and critical on-site support.

DEC also offers two on-site software support options to its customer, as follows:

- System Management Services (SMS) provides an assigned software account representative to review system operations, system management procedures, VMS security, system parameters and PCO and version status.
- Software Update Installation Service (SUIS) provides on-site service to install major updates, reset system parameters and give advice on the planning and impact of new versions of software.

Symptom-directed diagnostic tools, called Standard Package for Error Accounting and Reporting, also help detect and analyze hardware problems before they occur. If on-site service is required, a CE is automatically dispatched, along with necessary parts.

On June 20, 1989, DEC announced formation of a separately managed dedicated Desktop Service organization focused on providing service and support of terminals, PCs and workstation products in large corporate user environments. DEC indicated the program was in direct response to market requirements for assistance in maximizing end-user and MIS productivity, improving user software proficiency, facilitating migration to networks, minimizing the end-user learning curve, and permitting users to maintain a multivendor environment. DEC expects the program to strengthen its relationships with its customers and has indicated it may have to employ 500 to 600 additional support engineers to provide the added services.

The new desktop program consists of four multifaceted elements: start-up services, direct access advisory services, maintenance and integration services. Customers with 100 or more devices are eligible for the new program.

Start-Up Services, available only to maintenance customers, include system and options installation, OS and (optional) application installation, end-user orientation training; installation may be simply at-the-desk or pre-assembly at a designated staging location with optional burn-in.

Direct Access Advisory Services include telephone hotline support for the most popular PC applications, operating systems and network management software available today. Desktop maintenance is available on-site or at an on-premises customer repair location, and may be



customized according to specific customer needs. Response times, coverage and repair turnaround may be tailored also. Prices vary depending upon the product family supported, the volume of equipment under maintenance, and the degree of customer participation in the overall process.

Desktop Integration Services include installing and configuring network operating systems, installing network applications, and user training on the applications installed.

DEC estimates there are 22 million PCs installed in the U.S. alone, and management has stated it hopes to service a "million or two" of that base. DEC is currently authorized to repair more than 1,000 different products manufactured by about 100 different vendors; the firm subcontracts with other companies to repair equipment DEC technicians cannot handle.

Strategic Commentary DEC is making vigorous moves to expand its vendor alliances and systems integration capabilities, believing its networked products and systems architecture will be its principal source of growth over the next five years. DEC management has been quoted estimating that "eventually" one-third of DEC's revenue will come from systems integration-related businesses. To position itself, the company has begun to form alliances with hardware, software and services companies.

In November 1989, the company announced they will begin to jointly offer with Deloitte Haskins & Sells, systems integration services to manufacturing industries. The two companies have worked together in the past on SI projects. SI responsibility is part of DEC's Professional Services business unit.

In February 1989, DEC announced it would buy IBM's 3480 magnetic tape subsystem for resale to its mainframe customers.

The company has announced technology exchange agreements with Toshiba and Zenith, under which laptops and PCs will be certified as meeting worldwide connectivity standards within the context of DEC's Network Applications Support Program.

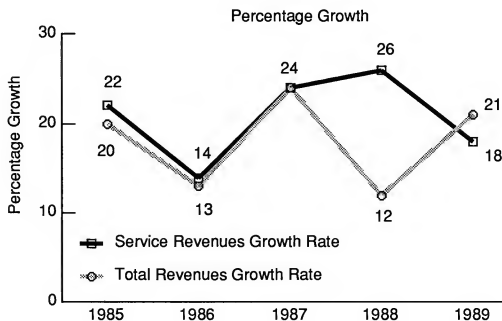
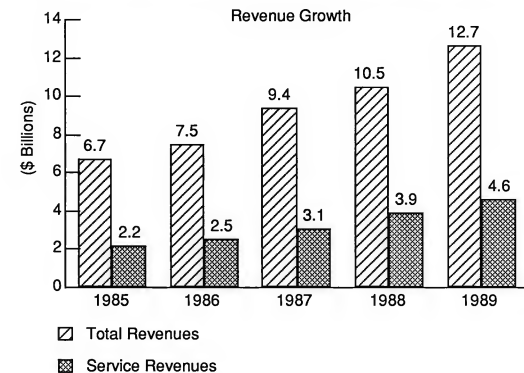
DEC's network management services were enhanced during 1989 to improve support for customers' local configurations of cable and interconnect hardware using an on-line data base providing real-time access to that equipment for 24-hour status of network elements and support for fault isolation. Apparently DEC's network services have a great deal of credibility; Kodak is in final negotiation with DEC for a contract to manage all Kodak voice and data communications needs, beating out IBM and others for the business.

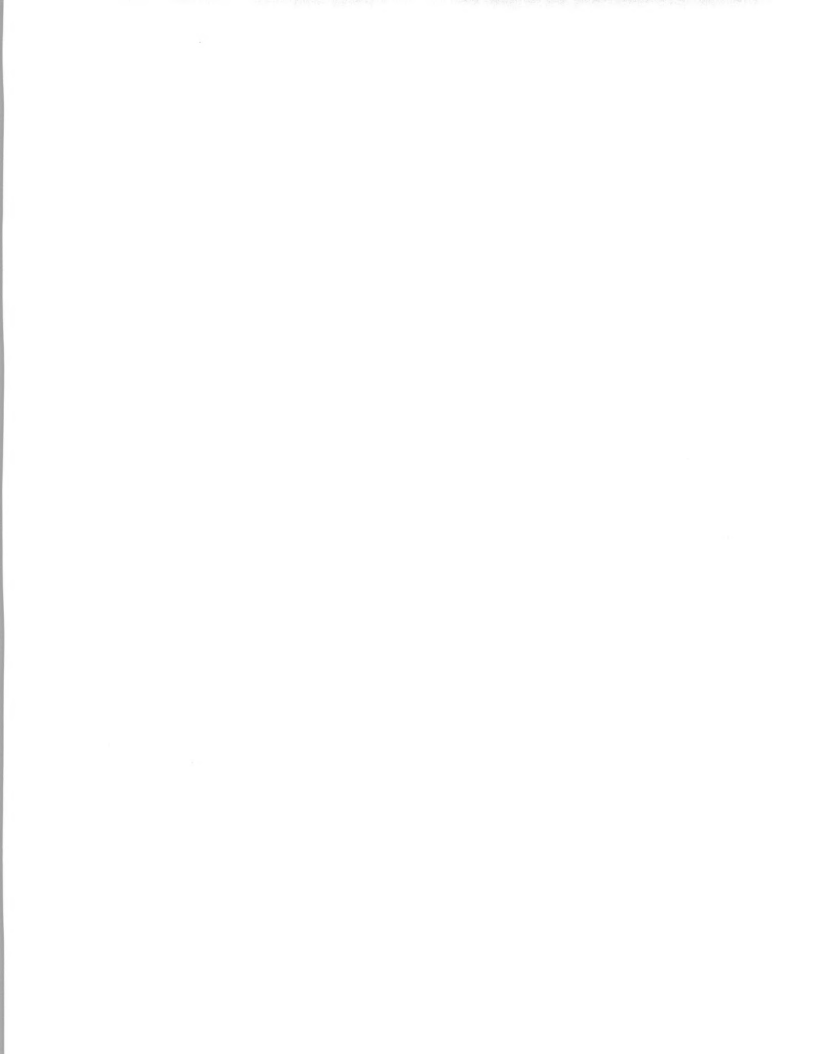
In October 1989, DEC announced DOS and graphical interfaces for its office automation software, designed to let computers made by different companies share information and work together. The new system will be compatible with DEC VAX computers as well as systems from IBM, Apple, and Microsoft.

In a move to support users who want to use their own staff to support software or maintain their own hardware, DEC has also tailored two support programs to provide training, parts and software support to self-maintenance customers.

Digital Equipment Corporation seems to have finely tuned its service programs to stay in harmony with its equipment and systems sales strategies—open systems and open services, providing teamwork across the enterprise.

EXHIBIT II-5

DEC's Total Company and Service Revenue Growth



**HEWLETT-PACKARD
COMPANY**

100 Mayfield Avenue
Mountain View, CA 94043
(415) 968-5600

John A. Young, President and CEO
Michael C. Leavell, Vice President and GM,
Worldwide Customer Support Operations

Total Employees: 87,000 (10/31/88)

Total FY 1988 Revenue: \$9,831 million

FY 1988 Service Revenue: \$1,855 million*

* includes support and repair for computers and I/S systems.

Does not include medical and analytical implementation

The Company

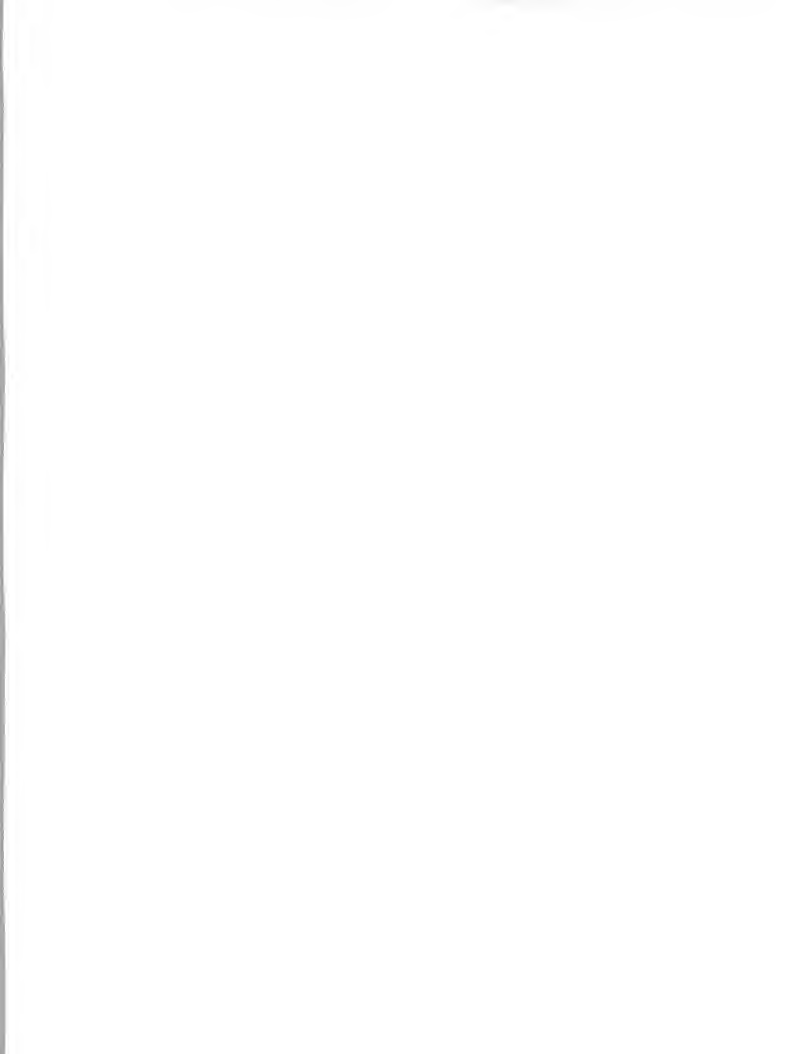
Hewlett-Packard designs, manufactures and services electronic products and systems for measurement and computation. Hewlett-Packard senior management has stated, "[its] basic business purpose is to provide the capabilities and support needed to help customers worldwide improve their personal and business effectiveness."

In addition to equipment and systems (hardware and software) used for design, manufacturing, office automation and information processing, general purpose instruments and computers, and handheld calculators, Hewlett-Packard derives sizeable revenues from medical electronic products which perform patient monitoring, diagnostic, therapeutic and data management functions, coupled with related support services and hospital supplies; gas and liquid chromatography, mass spectrometers and spectrophotometers used to analyze chemical compounds; and microwave semiconductor and optoelectronic devices sold primarily to manufacturers.

Hewlett-Packard experienced another growth year in 1988. The value of the order backlog at the close of FY 1988 was \$10,070 million, up 20% from the prior year, indicating good prospects for FY 1989. Total revenue increased 21.5%, after-tax income grew 26.7%, and earnings per share increased 34.4%. Services revenue grew 20.5% while cost of services grew 21.2%, indicating modest gross margin erosion; service margins for FY 1988 were still a very respectable 39.3%.

About 48% of Hewlett-Packard's revenues are derived from U.S. sales. International is likely to become more important in FY 1989, since orders in that sector grew 28% during FY 1988 compared to U.S. order growth of 12%.

While the first nine months of FY 1989 have not been quite as kind, revenues through July 31, 1989 grew to \$8,522 million (a 20% improvement over the same period in FY 1988), and nine months earnings are up by 2%. Third quarter FY 1989 is something of an enigma; revenue for the quarter is up by 23% (compared to third-quarter FY 1988), but profits are lower by 3% for the quarter. Results are still very respectable, considering the industry as a whole experienced single-digit revenue growth and a severe (approximately 30%) decline in income.



Service revenue growth has also slowed during the first half of FY 1989, but remains a significant 15.5% greater than the same period in FY 1988.

Probably the most significant event during 1989 has been the acquisition by Hewlett-Packard of Apollo Computer Corporation. Combined sales of the Apollo product line and Hewlett-Packard's current workstation line will vault Hewlett-Packard from the number four PC supplier to the number one spot in the engineering workstation market, slightly ahead of Sun Microsystems. Hewlett-Packard acquired an installed base of 93,000 systems and distribution channels reaching into 21 countries.

Apollo's 1988 sales were \$653.5 million, including \$88.9 million in worldwide service revenues. In the first quarter of 1989, Apollo's service revenues increased to \$31.7 million, up 10.1% over the previous quarter. As of December 31, 1988 Apollo employed about 580 personnel operating from 70 different facilities within the U.S. Apollo's customer support division has ranked high in user satisfaction for both hardware and software support, according to informal industry polls.

Hewlett-Packard has also received similar good reviews for technical support services provided in the reseller market.

Service Demographics

Hewlett-Packard employs approximately 15,000 service personnel worldwide, operating out of approximately 350 offices and 32 support centers. Headquarters for Hewlett-Packard's Worldwide Customer Support Operations is the new 450,000 square foot Customer Support Center located in Mountain View, CA. Other key hubs in Hewlett-Packard's worldwide support network are located in Atlanta, GA; Bristol, U.K.; Tokyo, Japan; Singapore; and Melbourne, Australia. Employment in the Mountain View CSC is approximately 1,130 professionals and management (which includes WCSO headquarters staff), providing customer education, marketing, service research and development, and direct customer support.

Hewlett-Packard Customer Services employs (worldwide) approximately 7,000 CEs, 4,500 Application Engineers, 1,500 network support professionals, and 1,500 response center specialists.

Revenue generated by this organization was \$1,855 million in FY 1988, a 20.5% increase over the prior year. The remainder of Hewlett-Packard's service revenues are derived in the medical electronics and analytical instrumentation business units.

Service Delivery

On April 4, 1989, Hewlett-Packard opened its new Mountain View Customer Support Center. The center's mission is to ensure that Hewlett-Packard's support programs are delivered consistently around the world. The facility houses executive offices, the Response Center,



Customer Education Center, Multivendor Support Operations, Application Support Division, Product Support Division, and four support research and development laboratories.

Hewlett-Packard's Response Center is part of an electronically linked, worldwide network of similar, but smaller centers. Response centers provide 24-hour assistance and problem resolution for application software, plus complete software and network diagnostics.

Coincident with the April opening of the primary CSC in Mountain View, Hewlett-Packard introduced three new software support programs. All software support services and features now fall into three areas: BasicLine, ResponseLine, and TeamLine.

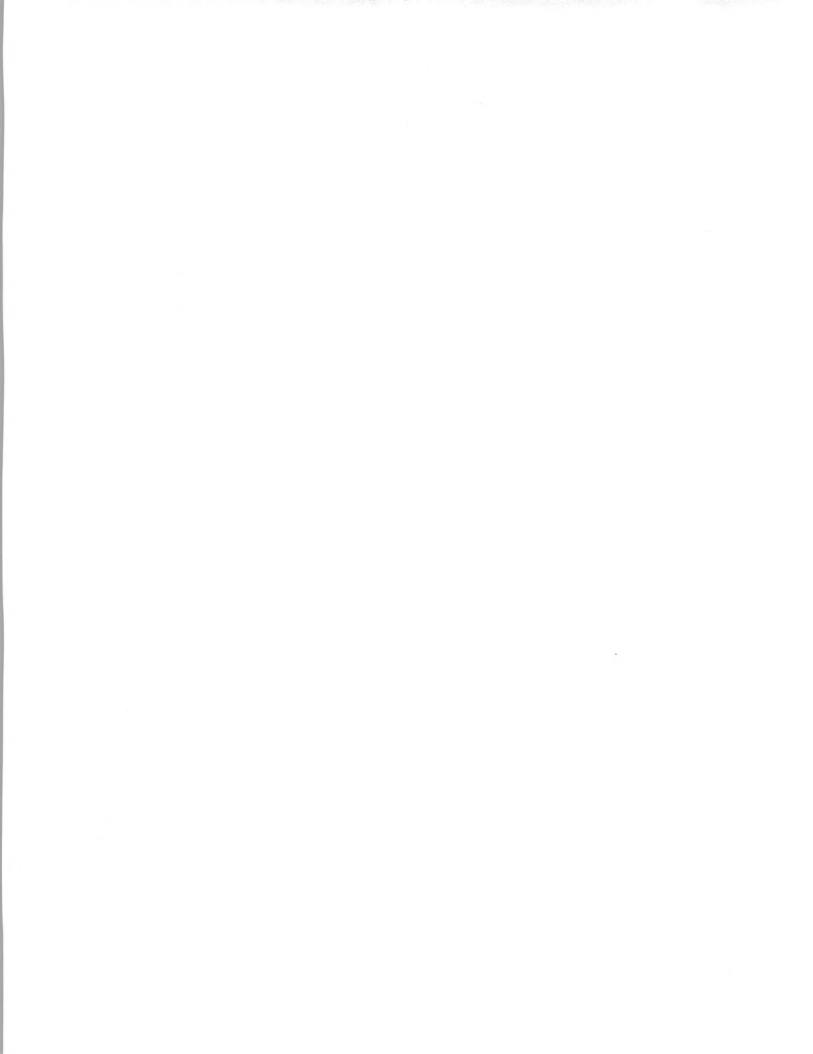
BasicLine is aimed to more self-sufficient users. Customers have electronic access to engineering notes, software problem solutions and training schedules. Also included is use of Hewlett-Packard software and documentation updates, and a complete package of support material updates.

ResponseLine provides problem resolution, user assistance and software maintenance, and expands Hewlett-Packard's previous telephone and remote diagnostic support options. Hours of access were expanded to 24-hours-a-day, 7-days-per-week, which is handled, in part, by switching support and problem resolution among the 32 CSCs, based on time zones. Customers may remotely (electronically) enter a description of the problem and a Hewlett-Packard engineer will respond by telephone within two hours. Customers may also gain remote access to data bases containing problems and resolution descriptions from all 32 worldwide centers. Customers may also leave problem information verbally with a CSC operator, and the engineer will return the call within two hours or as specified in the support contract.

ResponseLine customers also have access to known solutions through Power Patch tapes, referred to as a form of preventive maintenance.

TeamLine is the highest level of support, which provides customers with direct access to a team of Hewlett-Packard engineers, including a personal support consultant. A Hewlett-Packard support consultant will examine a customer's business goals, operating environment and applications, and recommend improvements to system utilization. TeamLine includes all features of ResponseLine and BasicLine services.

In conjunction with CSC services, Hewlett-Packard has developed and enhanced several support technology tools to improve systems availability and user satisfaction. Examples are: Predictive Support, which monitors Hewlett-Packard 3000 system hardware and provides early warning to transform unexpected repair actions into scheduled



maintenance; Laser RX, a PC-based tool using CD ROM technology for continuous, detailed analysis of Hewlett-Packard 3000 system performance; GLANCE, an ad hoc performance analysis tool; CAPLAN, a capacity planning, "what if" analytical tool; SNAPSHOT, an in-depth analysis of system performance (Hewlett-Packard 1000 and 3000) during a specified period of time; TREND, a long term global system performance tool showing resource utilization over time; and Custom Performance Consulting, which provides flexible consulting expertise using high-level professionals.

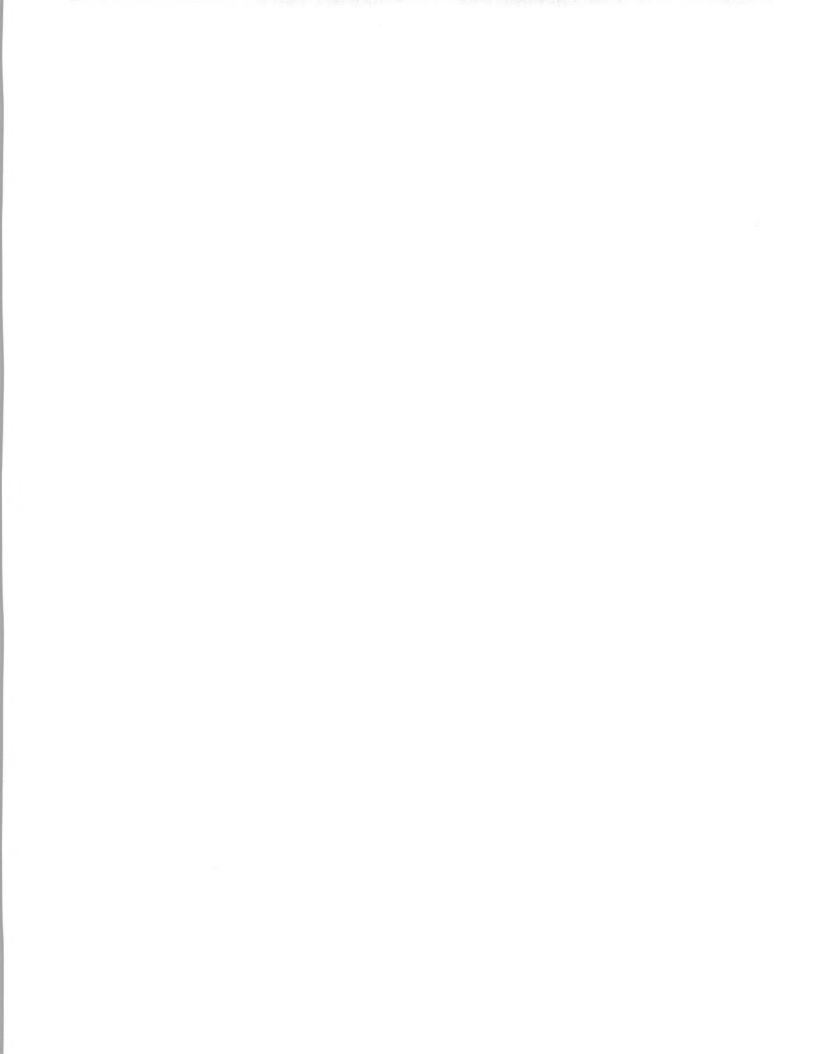
SupportLine provides electronic access to vital support information. LaserROM Service features access to information in manuals, bulletins, catalogs, application notes and CSC questions and answers. As of April 1989, 99 Hewlett-Packard MPE VE manuals, 73 MPE XL manuals and 31 UX manuals were available on LaserROM.

Hewlett-Packard has designated Atlanta, Bristol, and Singapore as Customer Network Centers providing specialized support to achieve high network availability to users. Over 75 network consultants, 250 network-trained application engineers, and over 7,200 field AEs and CEs at these sites receive guidance, direction, and support from the Mountain View Network Support Division.

Network support programs include Network Prepare, involving implementation planning and scheduling, and Network Startup Service, which includes scheduling and coordination assistance, configuration qualification, testing and documentation. Hewlett-Packard will provide customized network design services and on-going support under its NetAssure Program. Hewlett-Packard will also provide supplementary operations services, which provide packet network customers implementation and operations management assistance. PC-LAN support services are available as well.

Hewlett-Packard's Multivendor Support Organization provides a range of custom support services for a variety of equipment, including PCs using MS-DOS, UNIX and Apple operating systems; terminals from DEC, IBM, Televideo and Wyse; printers from Epson, Okidata, Apple and IBM; and compatible disk drives, monitors, plug-in boards and communications devices. MVS is targeted to Fortune 1000 companies and Hewlett-Packard's largest accounts, where single-source service is desired, and to selected larger metropolitan areas. A single toll-free call for service, hardware and software support, LAN coverage and assistance, loaners, repair reporting, installation and relocation assistance are features of Hewlett-Packard's MVS program.

Hewlett-Packard also offers a Strategic Partners Program to selected companies such as 3COM and Novell, and offers support services even if the customer's installation does not include Hewlett-Packard equipment.



Hewlett-Packard's Customer Education Center programs include a comprehensive learning program, classrooms dedicated solely to customer training, and a computer instruction room. Courses focus on Hewlett-Packard instruments, computer systems and software applications. Only in the U.S. center are courses offered in electrical and mechanical CAD, advanced MPE XL and UNIX, and board test systems. Hewlett-Packard's Product Support Training program teaches users and resellers how to service Hewlett-Packard products themselves.

For organizations with distributed portable terminals or peripherals, Hewlett-Packard offers Express Exchange Service. Hewlett-Packard will replace a failed unit anywhere in the country using air express the same day the customer request is made. Failed units are to be packaged in an Hewlett-Packard-provided kit, and returned to Hewlett-Packard within three working days for repair and restocking. For site-based workstation hardware, Hewlett-Packard offers priority on-site service (4 hours), next day on-site, scheduled on-site and customer return (mail-in or carry-in). Hewlett-Packard depot centers are located in Rolling Meadows, IL (Chicago); Paramus, NJ; Atlanta, GA; Richardson, TX; Fullerton and Mountain View, CA; and Englewood, CO.

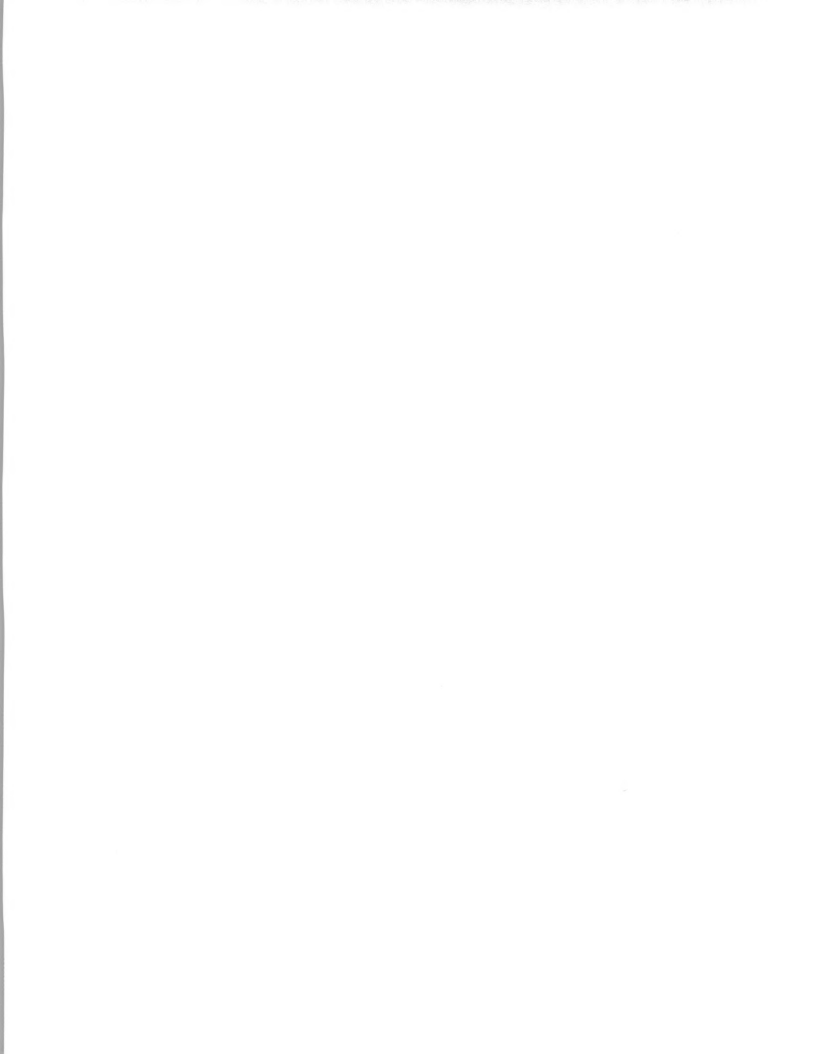
Hewlett-Packard also offers a full range of disaster planning and recovery services, including full backup services for the Hewlett-Packard 3000 series of systems.

Strategic Commentary

Hewlett-Packard has declared that it is not attempting to directly penetrate the systems integration business, preferring instead to team with companies already generating a major share of their revenues from SI. Hewlett-Packard also initiated the multivendor program to support its own customers, but has recently expanded its declaration to apply to network customers who do not use any Hewlett-Packard equipment.

The company has taken an 8% equity stake in 3COM; formed an alliance with Electronic Data Systems; assembled a 175-person organization to increase its ability to provide integrated solutions; purchased Eon Systems, a manufacturer of the LanProbe LAN management system; acquired 10% of Spatial Technology, a privately held CAD software company; invested 25% in Hilco Technologies, which develops process monitoring and control software and offers SI services for manufacturing companies; and taken a 10% position in Octel Communications, a voice mail supplier.

More than any competitor, it has positioned its services offerings to appeal to customers with multinational or worldwide interests and characteristics.



Hewlett-Packard is both a fierce supporter of open architecture and a proponent of unique proprietary enhancements to its own hardware and software which operate in an OSI environment.

It appears that Hewlett-Packard has a finely tuned market and product niche strategy, and service support is playing a major role.

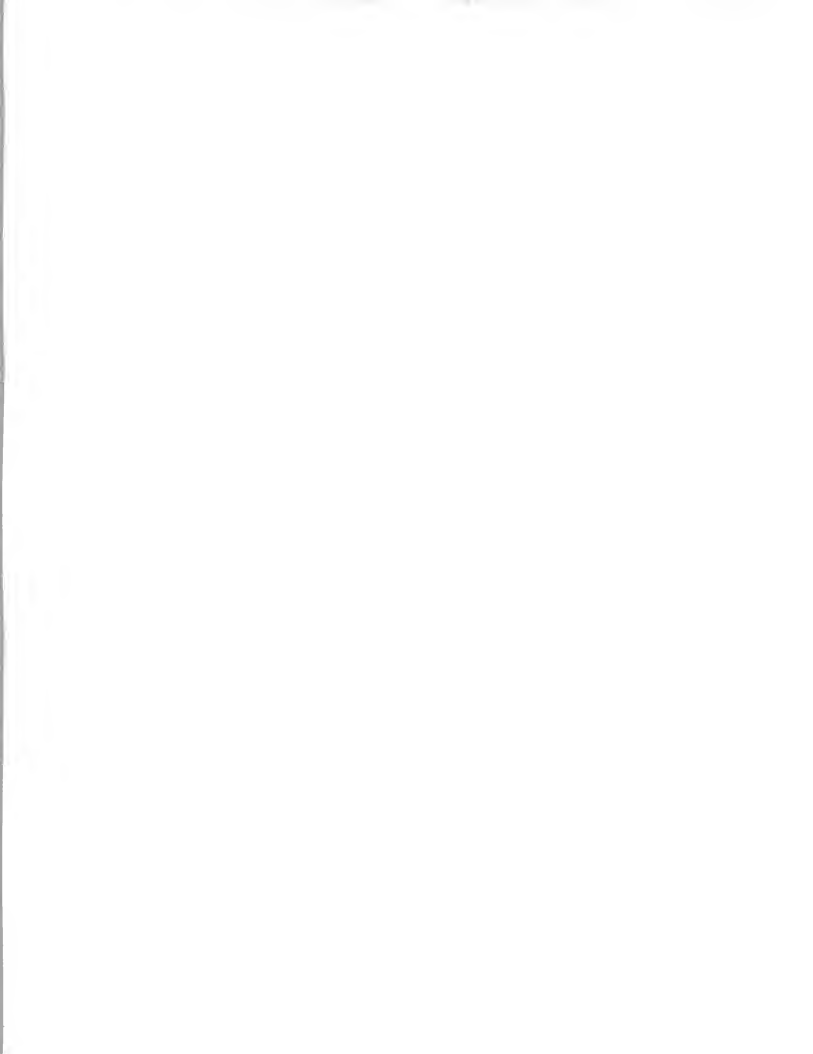
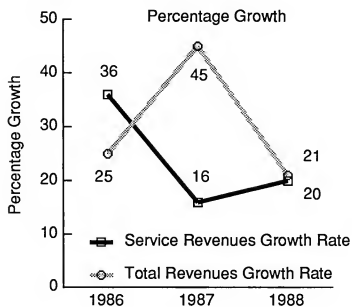
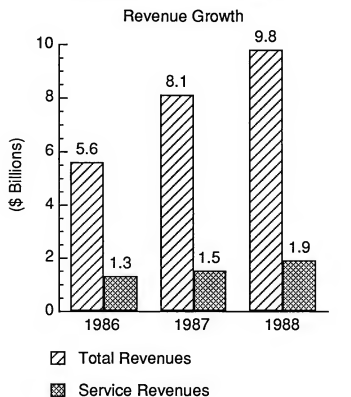
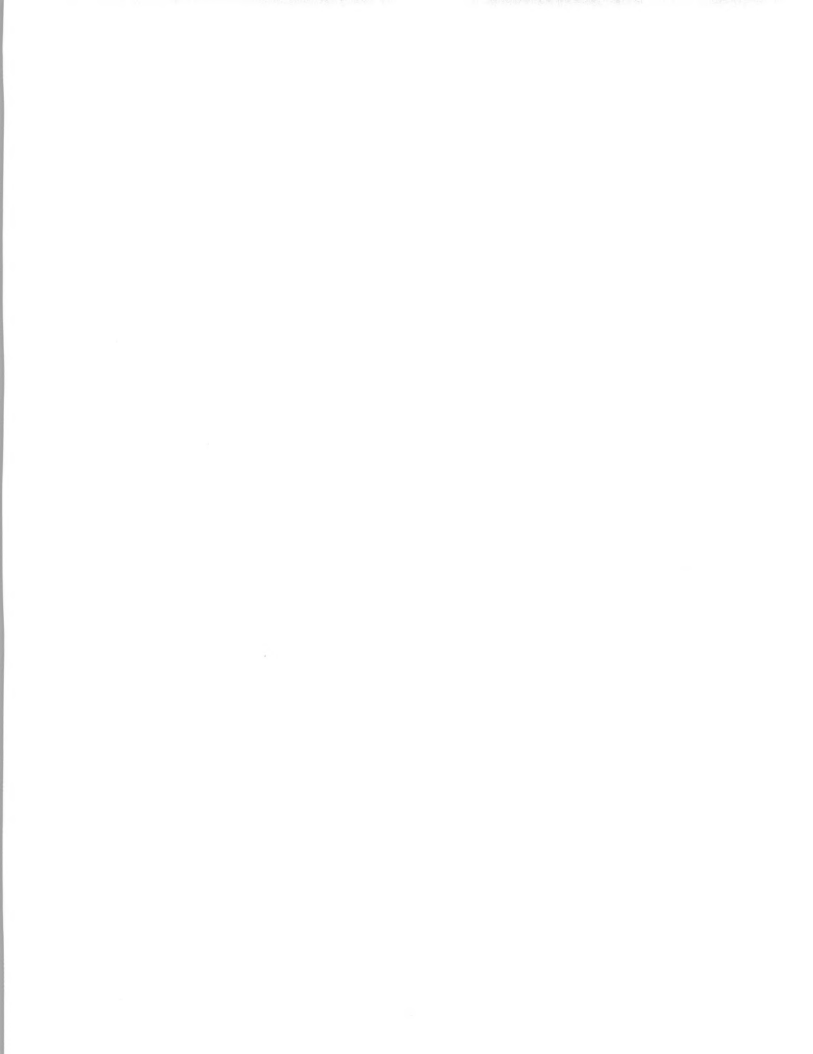


EXHIBIT II-6

Hewlett-Packard's Total Company and Service Revenue Growth



IBM CORPORATION

Armonk, NY 10504
(914) 765-1900

John F. Akers, Chairman
David E. McDowell, President,
National Service Division
Total Employees: 387,112
Total 1988 Revenue: \$59,681 million
Total 1988 Service Revenue: \$7,347 million*
* Separately billed charges for maintenance

The Company

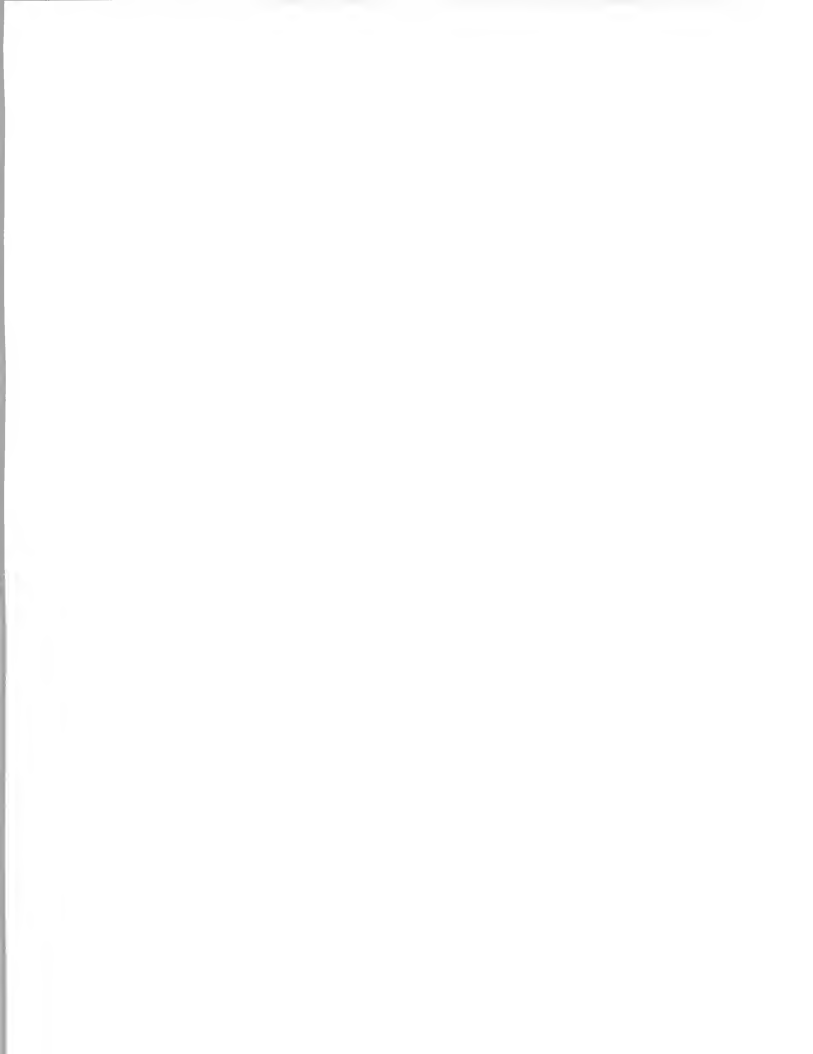
IBM is the leading provider of information processing systems and services to all industries, with annual revenues four to five times greater than its largest competitors in the information technology business sector. IBM commands an 87% share of the large systems mainframe market.

IBM worldwide revenues have been growing (erratically) at a compound annual rate of under 7% since 1984. Earnings per share and return on stockholders' equity are still below 1984 levels, and 1989 earnings are likely to be lower than 1988 even considering IBM's traditionally strong fourth quarter. IBM's third quarter 1989 profits were down 30% from the comparable period last year, cumulative nine-month profits are almost flat, and 1989 operating margins for the third quarter have eroded by 3 points. Return on stockholders' equity continues below 15%, compared to 26.5% in 1984.

INPUT believes that a factor in IBM's lower-than-desired revenue and profit growth can be attributed to its aggressive price reductions and greater expenses for new maintenance programs in the U.S. In 1986, revenue from U.S. maintenance services was \$4,016 million; in 1988, revenue in the same category declined to \$3,102, a 22.8% reduction in two years. A 25% maintenance services revenue growth rate outside U.S. operations in the comparable 1986 to 1988 period kept total worldwide maintenance services revenue essentially equal to last year's reported figures.

IBM's worldwide maintenance services revenues are 12.3% of total corporate revenues, about 10 points less than the industry average and as much as 20 points lower than several competitors such as NCR, Unisys, Control Data and Bull HN. IBM therefore enjoys significant competitive leverage relative to its systems competitors when it adjusts its maintenance programs to become more attractive in the information technology marketplace.

IBM revenues from rentals and financing have shrunk during the last five years, from 15% of total revenue to about 4%. The relative importance of software has almost doubled during the same timeframe, from 7% in 1984 to 13% of total worldwide revenues in 1988. Gross profit margins for IBM software exceed 70%.



IBM's longer-term master plan for restoring revenue and earnings growth seems to revolve around its release of Systems Application Architecture (SAA), a software scheme it devised in 1987. On May 16, 1989, IBM announced software to tie its mainframes, the AS/400 minicomputer and the PS/2 together for what it calls cooperative processing. SAA specifications have been released by IBM to the industry, and other manufacturers are being encouraged to adapt their products to this new architecture, which is hoped to enable the largest accounts to network their corporate-wide information systems together for improved accessibility and credibility of data used to operate their businesses.

IBM also seems to be refocusing and narrowing its concentration on information technology and related services. While purchasing minority interests in companies such as Computer Task Group, a 23-year-old, \$200 million (revenue) company providing systems software, engineering and systems integration consulting services, IBM finally completed its agreement that gives Siemens ownership of Rolm Systems, which IBM acquired in 1984. IBM will take joint ownership with Siemens in the Rolm Company, which will sell and service Rolm's products and Siemens' private network telecommunications and ISDN capabilities to customers in the U.S.

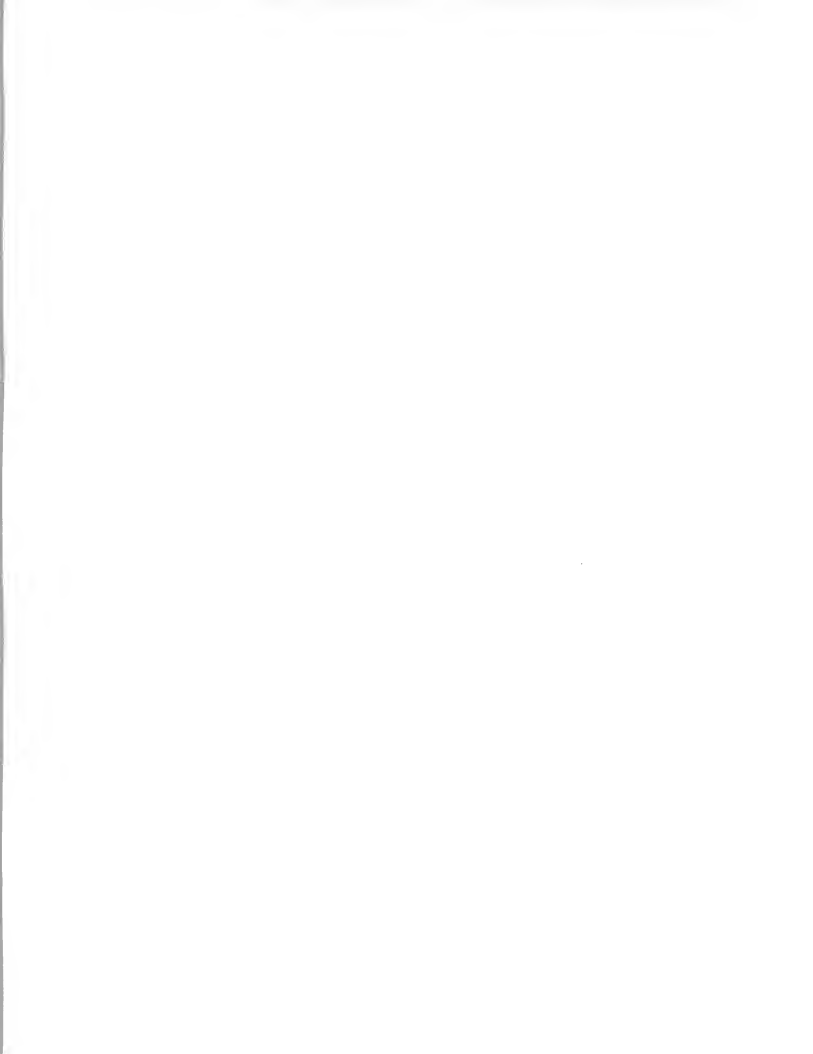
Service Demographics

According to W. Wilson Lowery, Jr., who until recently was Vice President, Service Business Development, NSD, IBM has been placing emphasis during this past year upon enhancing the value of its basic maintenance services, and streamlining its business practices and procedures. Customers have seen a rapid and extensive series of new service program announcements, some of which reduced prices considerably. IBM has been internally addressing concerns in four areas—service quality, investment in new service technology, business practice simplification and introduction of more personalized services.

INPUT believes IBM's U.S. service organization employs approximately 27,000 people, of which 5,000 are dedicated to remote service facilities and 17,000 are field engineers operating from 233 business locations nationwide.

Service Delivery

All IBM system user maintenance customers receive 24-hour, 7-days-per-week coverage as part of their standard maintenance agreement. Customers are assured of spare parts availability by IBM's Parts Inventory Management System, which tracks spares through two national distribution centers, 21 regional parts centers, 323 branch office locations, and countless parts vans and CE tool kits. Each CE carries a light-weight portable terminal jointly developed for IBM by Motorola that links the CE using RF or hardwired data communications to an extensive network of technical support which includes dispatch, spare parts handling, service call reporting and diagnostic routines.



IBM opened 1989 with the announcement on January 24 of ServicePlan™, which “consolidates all IBM service offerings into one simplified contract, and provides customers with a number of savings opportunities.” Highlights of the new program include reduction of contract documentation from more than 25 separate agreements to one; implementation of an estimated single invoice for service based on projected annual maintenance needs; multiple-year prepayment discounts ranging up to 50% under the Extended Maintenance Option (EMO); inclusion of locally attached PCs and terminals to the CSA discount plan; extension of the MRSA agreement and associated discounts to high-end processor users, thus reducing the stringent self-help constraints of CSA on high-end customers; elimination of the requirement to have either a Rolm PBX or an IBM processor to participate in IBM’s Telecommunications Services Network Support plan; and extension of new IBM service plans to IBM Remarketers.

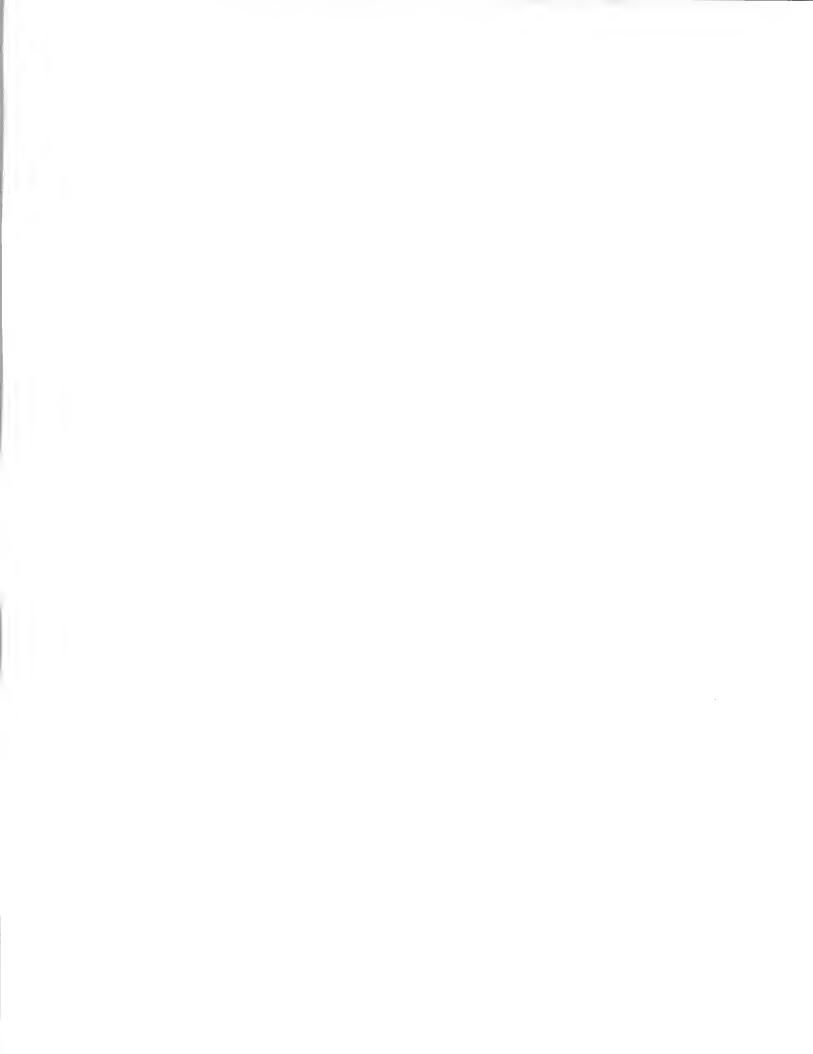
Under the IBM Remarketer End-User Service Plan, authorized VARs may sell IBM service contracts and the EMO directly to their customers. VARs may package the IBM programs with their own offerings, and resellers are free to do what they want with service pricing.

Effective March 8, 1989, IBM further strengthened the relationship between customer and VAR by extending its service programs to its Business Partners or C-level dealers who market the PS/2 and IBM PCs. The Entry Systems Service Amendment (ESSA) enabled Business Partners to take advantage of the relationships and “packaging” alternatives offered to Remarketers of the AS/400 earlier in the year. IBM announced it would initiate, where appropriate, on-site assistance from IBM CEs to help Business Partners solve particularly difficult problems, at no charge to the Business Partner for this technical support.

IBM also improved the availability of emergency repair parts support to its Business Partners as a part of this release. A new stock balancing program will result in a 10% increase in parts available to dealers under its spare parts exchange program, reducing dealers’ dependency upon parts shipped direct from the factory.

It is clear that IBM is allowing dealers to become the primary source of support for its PS/2 and related entry-level products. Under ESSA, non-servicing dealers can earn 10% commission for selling IBM service agreements. In Spring 1989, IBM established a 12-member Service Advisory Council to better communicate with dealers on its new service programs and to address any shortcomings in the plans.

In March, Service Director, a PS/2 Model 80 with proprietary software to monitor storage-system performance, was announced coincident with ServicePlan™. The unit has been programmed to call up an IBM service center to alert an IBM expert system program when a problem occurs.



The expert system analyzes data, recommends a corrective service procedure, and can even dispatch a CE and replacement parts. The system works with IBM's 3380 and 3880 disks, 3890 document processor, and the 3480 tape storage systems. Service Director is being enhanced to include printers and other peripherals.

The Network Traffic Analysis offering links a customer to an IBM support facility in Gaithersburg, MD, for SNA network problem solving. Four software components make up the offering: Virtual Route Performance Monitor, which gathers data from trace facilities; Virtual Route Configuration Monitor, which stores customer system configuration for reference; Virtual Route Calculator, which lets users optimize response times on their networks; and Virtual Route Analyzer, which identifies possible network configuration bottlenecks which may be causing poor response time.

In 1989, IBM entered the disaster recovery business, being referred to as Business Recovery Services, offering backup services from two 3090 system centers, in Tampa, FL, and Franklin Lakes, NJ, and many more small and midrange facilities; formed or hinted at alliances with major systems integrators; and took over entire data center operations on a long-term contract basis. IBM offers customized site management and network management services, and has offered to tailor any or virtually all portions of its programs to individual customer's needs.

On October 3, 1989, IBM announced five new service offerings and expanded or enhanced three existing programs:

- Problem Management Productivity Services is designed to improve productivity of the customer help desk and user support groups. Tools developed under this program have resulted in automated access to the problem management system, significant usage of expert systems for problem identification and automated placement of service calls electronically to IBM, and automatic updates of the problem record from IBM into the problem management system. The offering automates many support group tasks and links these groups electronically, increasing their effectiveness and efficiency. An expert system knowledge base build facility allows customers to construct bases that pertain to their own applications, processes or procedures, and to access them using the expert system consult facility.
- Customized Operational Services Express is designed to support special site preparation needs of midrange customers, and is aimed primarily at AS/400 accounts. IBM promises a firm cost estimate for the contractor services necessary to prepare a site for equipment installation with four days, and completion of the project within 30 days of obtaining necessary construction permits. A five-year, limited warranty is provided.



- Installation Quickstart is designed to relieve midrange customers of tasks associated with system installation, including project management by NSD, coordinating installation of non-IBM installed hardware, and installation of system software and designated licensed program products. Site planning may include two site visits for an environmental review and assessment of preparation activities, as well as set-up of equipment.
- AS/400 SystemXtra provides a total service solution after system installation, and may include network support, repair coordination of multiple vendor services, a toll-free call to an IBM Technical Service Center for assistance with problem determination and source identification. The customer may author questions via an Electronic Customer Support facility and receive feedback of problem status and resolution.
- Network Traffic Analysis helps to identify causes of performance problems in an SNA network, and provides recommendation to improve network performance. An expert system identifies likely causes of performance problems with specific recommendations for resolution.
- Business Recovery Services, Data Center Services and Equipment Modification offerings have also been enhanced during 1989.

As part of its approach to accommodating customers' every need, IBM now covers more than 2,000 non-IBM products from over 225 manufacturers in its Multivendor Service programs, pledging to manage, coordinate or perform services as required in even an all-non-IBM environment.

Strategic Commentary

According to Wilson Lowery, the IBM service mission is to reduce service costs, enhance customer control of their computing environment, and enable customer growth by offering a full range of support services tailored to individual needs. INPUT believes that IBM has recognized the potential for superior services to pull product through to the marketplace, as well as the growing thirst of customers to use information technology as a competitive advantage in their individual market sectors.

IBM is apparently very satisfied with the progress being made by National Service Division management—in January 1989, Dave McDowell was elected an IBM corporate vice president.

Customers have been eager to increase their own focus on the business they know best, leaving service and support to the systems integrators and other third parties. IBM is increasing its probability of selling more hardware by adopting more flexibility and partnering with its customer base.

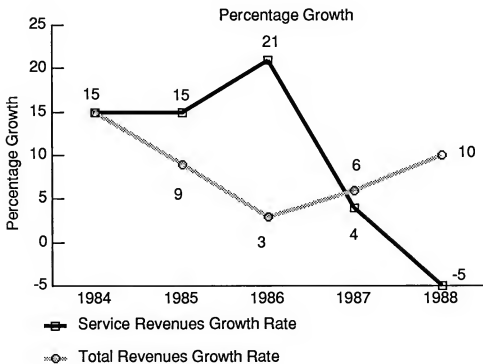
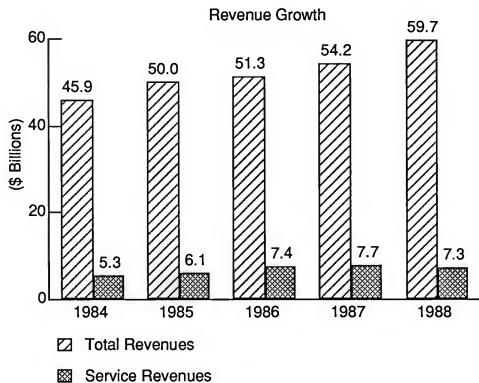
While revenue and earnings growth during the next two years will continue to be difficult for IBM, the longer-range strategy is likely to pay off handsomely. Competitors in the information technology industry are much more dependent upon substantial service revenues and profits for overall acceptable financial results, which will make competitive reaction to current IBM service program tactics difficult to match or beat!

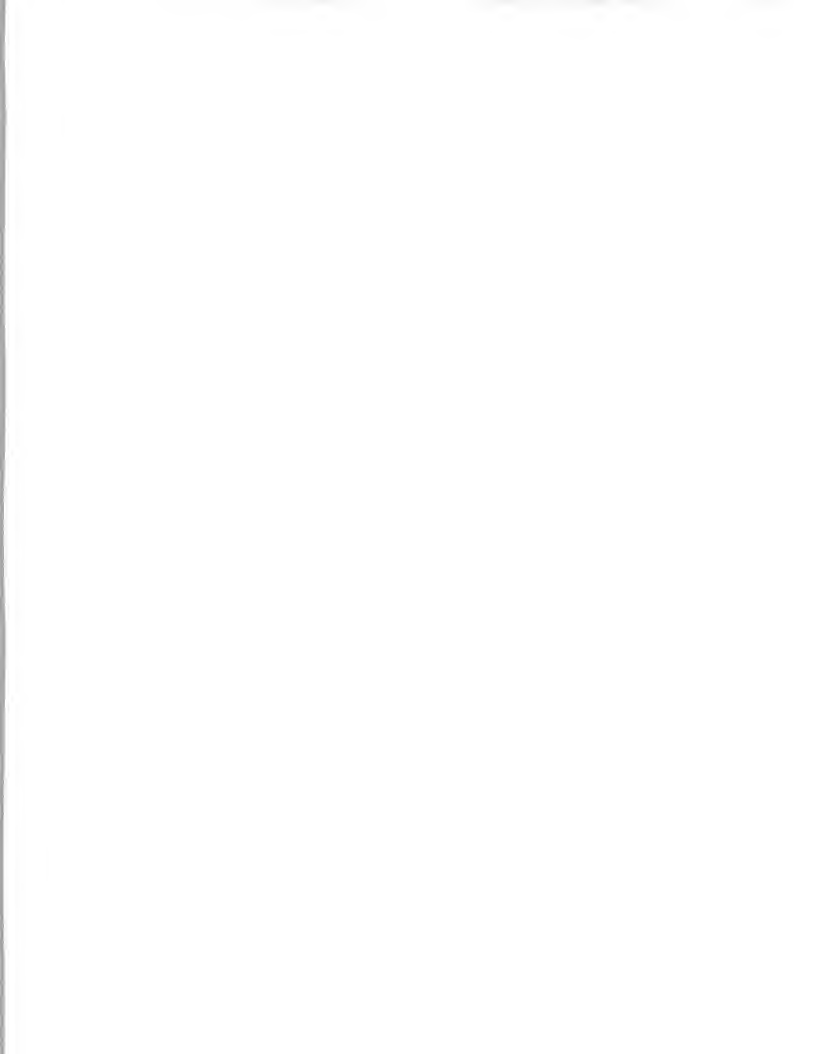
Information System executives in major corporations will be able to spend more time on information strategies to improve their business results, leaving operations tactics to IBM. This seems to be a win-win proposition.

Independent third-party service organizations may suffer most—the alternative to IBM maintenance may be IBM itself. The IBM goal is total service solutions, not just maintenance. Also, the policy is clear—if you don't see what you need, just ask.



EXHIBIT II-7

IBM's Total Company and Service Revenue Growth



NCR CORPORATION

1700 South Patterson Blvd.
Dayton, OH 45479
(513) 445-5000

Charles E. Exley, Jr., Chairman and CEO
Richard B. Reese, Vice President,
Customer Services

Total Employees: 60,000

Total 1988 Revenue: \$5,990 million

Total 1988 Service Revenue: \$2,097 million*

* includes software maintenance, custom programming and
data center services

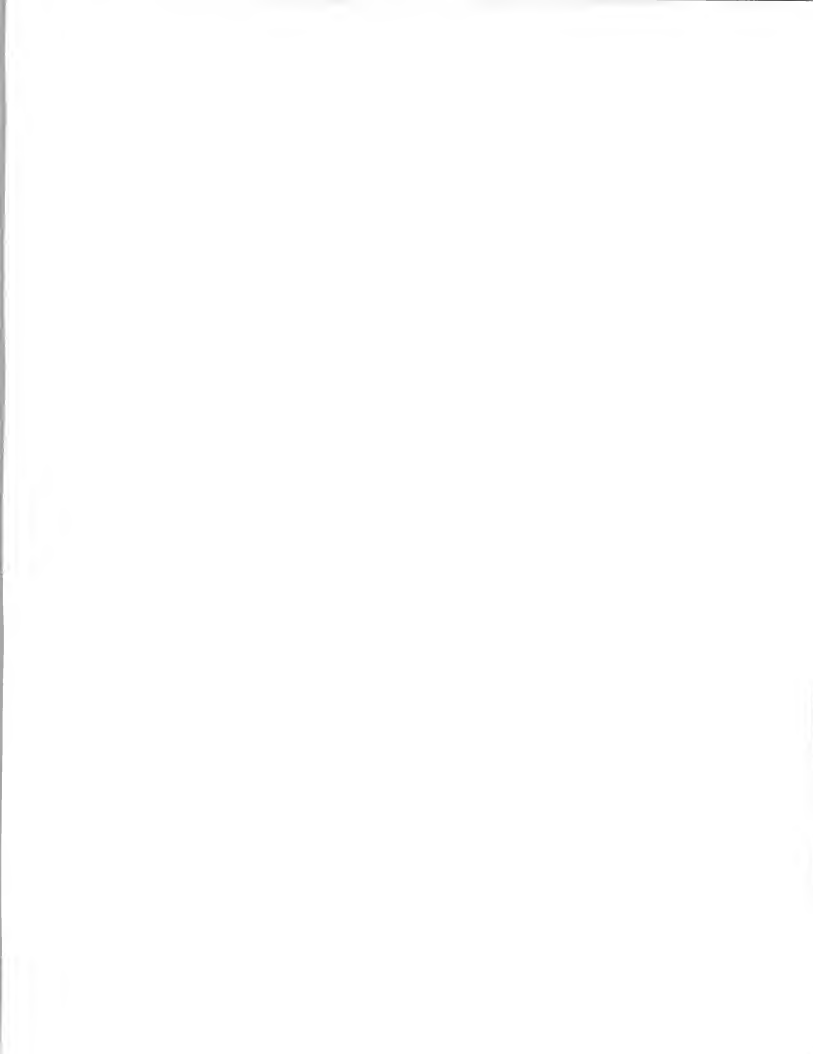
The Company

NCR is a major provider of information systems products for worldwide markets. The company's products include industry-specific workstations and products for retail, financial, manufacturing and other markets; general-purpose workstations such as personal computers, office automation workstations and video display terminals; multiuser computer systems including small and midsize computer systems for departmental use, and systems for interactive and batch processing; large computer systems for on-line transaction processing and batch processing; communications processors, which process information between large computer systems and a variety of data communications devices such as terminals; and synergistic products such as semiconductors, data centers, field engineering services, software services, education, business forms and supplies, and financing alternatives.

In late 1989, Businessland announced it was contracting with NCR to resell the NCR family of PCs to replace the Compaq product line, which was discontinued by mutual agreement earlier in the year.

In a probably unrelated announcement, NCR and IBM in early November 1989 formed an agreement to trade I/O designs for microcomputer systems. NCR said it will support IBM's Micro Channel Architecture (MCA) as a preferred standard, and IBM will recognize NCR's Small Computer Systems Interface (SCSI) as "one of the standards" for I/O attachment. NCR intends to be an early second-source for MCA chips, boards and systems, while retaining SCSI for high-performance applications. IBM has displayed SCSI disk controllers for the PS/2, and hinted that such products might be produced in the near future.

Approximately 39.3% of NCR's product revenues in 1988 were generated from industry-specific workstations for the retail and financial markets, two segments in which NCR has a powerful heritage. In 1988, NCR's retail workstation revenues declined 4%, after two relatively flat prior years. Financial workstation revenues grew 19% in 1988, compared to 17% in 1987 and 22% in 1986. Financial revenue gains were driven primarily by major gains in worldwide sales of automated teller machines.



NCR's small and midsize multiuser computer systems sales declined 6% in 1988, following a 32% increase in 1987. Significant gains are still being made by the NCR TOWER family of super microcomputers.

NCR achieved another record year, financially, during 1988. Total revenue increased 6%, net income rose 5%, net income per share rose 18%, working capital improved by 21%, and return on stockholders' equity reached 20%, more than 5 points higher than IBM. NCR derives 41.7% of its revenue from the U.S. and 33% from European operations.

Services revenues, consisting of hardware and software maintenance, custom programming and data processing services, rose 5% in 1988, after gains of 13% in 1987 and 1986. The 1988 growth rate was driven primarily by strong gains in custom programming services and software maintenance from international operations. Gross margins from service in 1988 were 37.9%, up from 36.8% in 1987 and 37.3% in 1986.

In 1989, revenues from services are declining, slightly, down to \$1,029.7 million for the first six months compared to \$1,040.3 million for the same period in 1988. Overall, NCR's 1989 revenues are flat for the first nine months of 1989, profits are down by 9% and earnings per share are 1.5% lower.

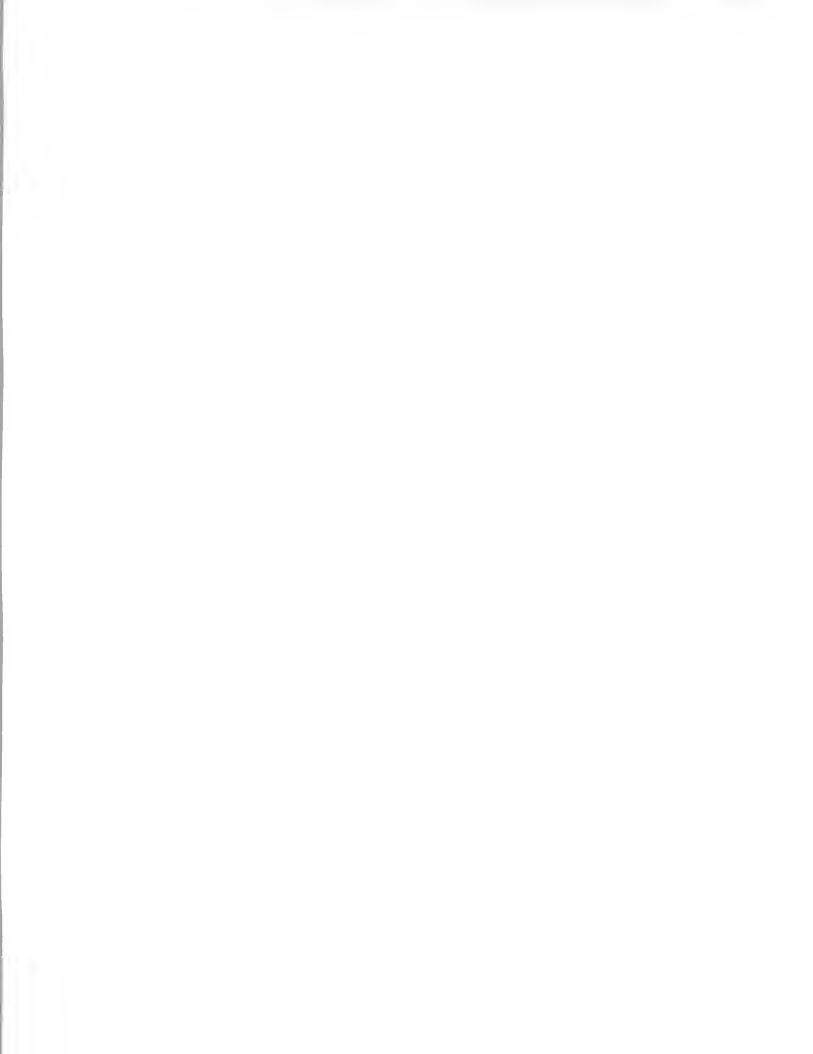
Service Demographics

NCR's total U.S. service revenue is about \$950 million, of which slightly more than 80% is derived from hardware maintenance. The company employs about 21,000 people in its service operations in over 1,000 different places around the world, of which 16,500 are field personnel responsible for hardware or software support. U.S. service employment is estimated at approximately 6,000 field repair personnel operating from 425 different service locations and 20 repair or exchange centers.

The major parts distribution facility is located in Peachtree City, GA, and other depots are located in Oiso, Japan; Schipol and Augsburg, Germany; and Dundee, Scotland. Parts distribution, repair, acquisition and disposition anywhere within the U.S. is managed by the Peachtree City Worldwide Service Parts Center (WSPC).

NCR is believed to generate approximately \$40 million to \$50 million in third-party maintenance revenues in the U.S., which need not be directly related to any NCR product line or market segment.

Effective January 1, 1990, U.S. sales and service operations are being reorganized away from the fully vertical integration by line-of-business approach NCR put in place during the 1970s. Seven U.S. geographic field sales and support divisions are being formed, each of which is expected to act as an autonomous business unit with its own specialized sales and support staff in the field. According to NCR, the



reorganization is intended to provide more timely decision making and further empower people at the local level to deliver products and services which give customers a leading edge in the 1990s.

NCR Comten, a wholly owned subsidiary specializing in front-end communications and network processing systems, has more than 100 sales and service facilities located throughout the U.S. and Canada which operate independently from NCR's other sales and service operations.

Service Delivery

While a broad variety of "standard" service offerings are available in NCR's catalog, NCR proposes to analyze the customers organizational and operation structure, obtain system configuration and usage patterns, and then draw from its range of maintenance options to tailor service solutions based on how the customer's organization actually functions.

Services offered include on-site or depot repair service, full parts and labor or labor only, cluster on-site service, dedicated on-site CEs, single source service on non-NCR equipment from major manufacturers, shared service programs, equipment installation and de-installation, relocation, upgrades and engineering modifications, remote diagnostics and resolution, preventive maintenance, professional account management and flexible hours of coverage up to and including 24-hours-per-day, 7-days-per-week. NCR offers guaranteed response times of either two or four hours, depending upon product line, and will also guarantee system availability as part of a customized service solution.

NCR will also provide site services, including planning, preparation and power conditioning; network services, including consultation, configuration, installation and verification; disaster back-up and recovery assistance; business equipment and media supplies, and; comprehensive help desk programs including implementation support, assessment, consultations and software.

The company uses a national central dispatch system and provides performance reporting which covers CE and equipment performance. Quarterly, over 25,000 customers are surveyed to determine if needs are being met in a manner acceptable to the customer and NCR.

Over 70 different manufacturers are included in non-NCR products supported under NCR's Single Source Service program. NCR also sells power conditioning products such as transient suppressors, voltage regulators, standby power modules and uninterruptible power supplies as part of its program to combat power disturbances which may interfere with equipment operation.

NCR's Network Products and Maintenance program includes consultation services for both LAN and WAN networks and hardware products, including network configuration, installation, verification and maintenance. NCR CSD supports Starlan, Token Ring and Ethernet, X.25, T1, and fiber optic products; Bell Operating Company interfaces; analog modems and multiplexers; line drivers, converters and bridges; and software for network design, performance and modeling.

Strategic Commentary

NCR still seems to be highly dependent upon hardware maintenance for most of its service business, although software and total systems approaches are being discussed and marketed. In February 1989, for example, it was reported that NCR's SI group, located in San Diego, CA, was still awaiting its first outside customer client. The 14-person group has been concentrating on working with NCR's other sales divisions.

At the corporate level, NCR has organized its software support and systems engineering services within an overall Customer Services umbrella; at the local level, however, hardware maintenance and software/systems engineering groups remain at peer reporting levels. Whether this will result in competitive disadvantage versus programs from companies such as Hewlett-Packard and DEC remains to be seen.

NCR CSD performs maintenance on satellite earth stations and self-service automated video vending equipment, along with selling and servicing data networking equipment, including T1 multiplexers, X.25 packet network switchers made by Case/Datatel, under an agreement signed late in 1989.

In May 1989, NCR took over the \$15 million (three-year value) national service of XScribe-designed and manufactured computer-aided transcription systems and a base of 8,500 end users; in December 1988, however, NCR sold its rapidly growing \$10 million ATM services business (providing cash replenishment and first line maintenance) to Wells Fargo Armored Service Corporation.

Gary Burnett, Vice President of the U.S. Customer Services Division, has stated the CSD mission is to keep current customers satisfied, regain lost customers, make product sales that relate to service performance, gain new non-NCR maintenance business, and make other sales as a convenience to its customers.

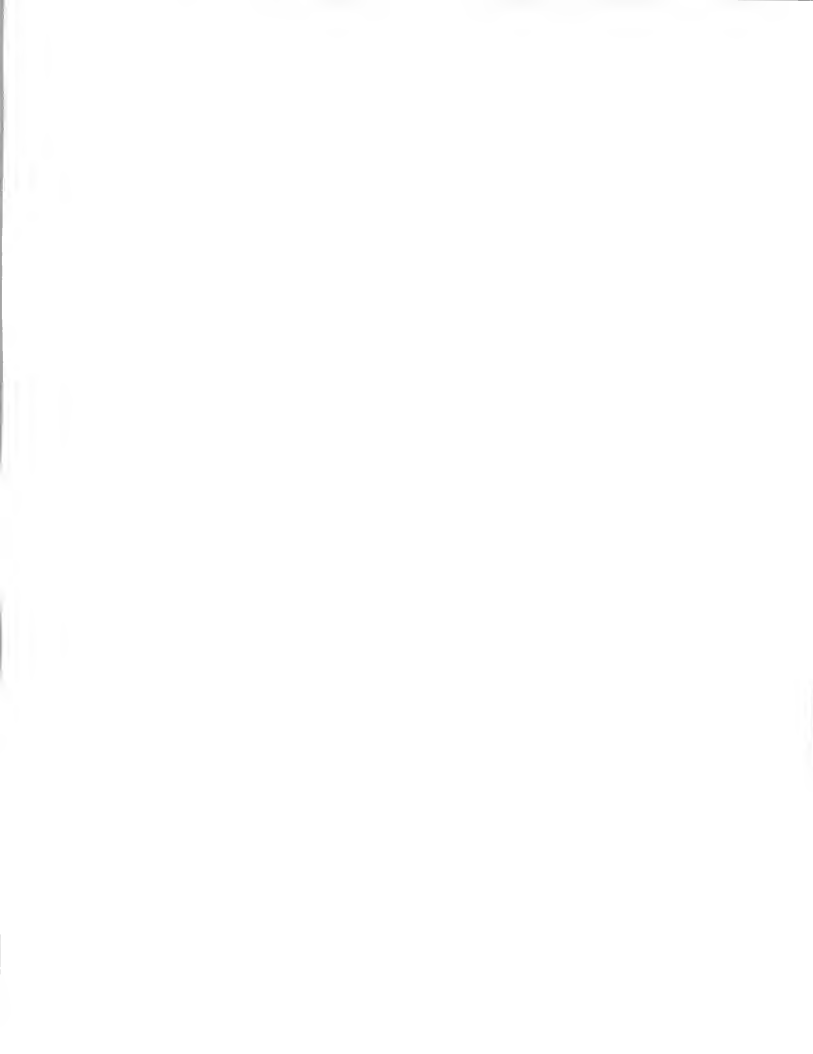
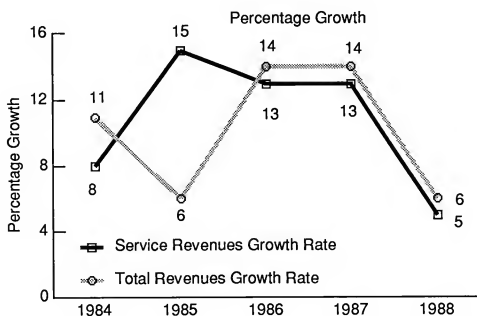
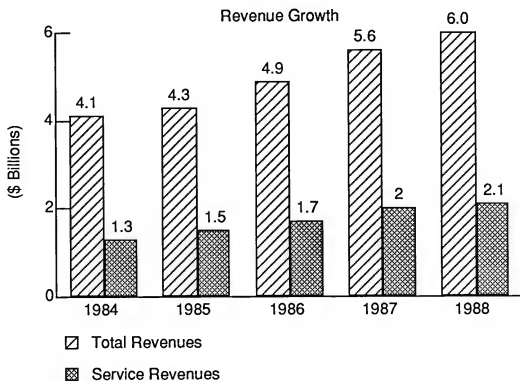
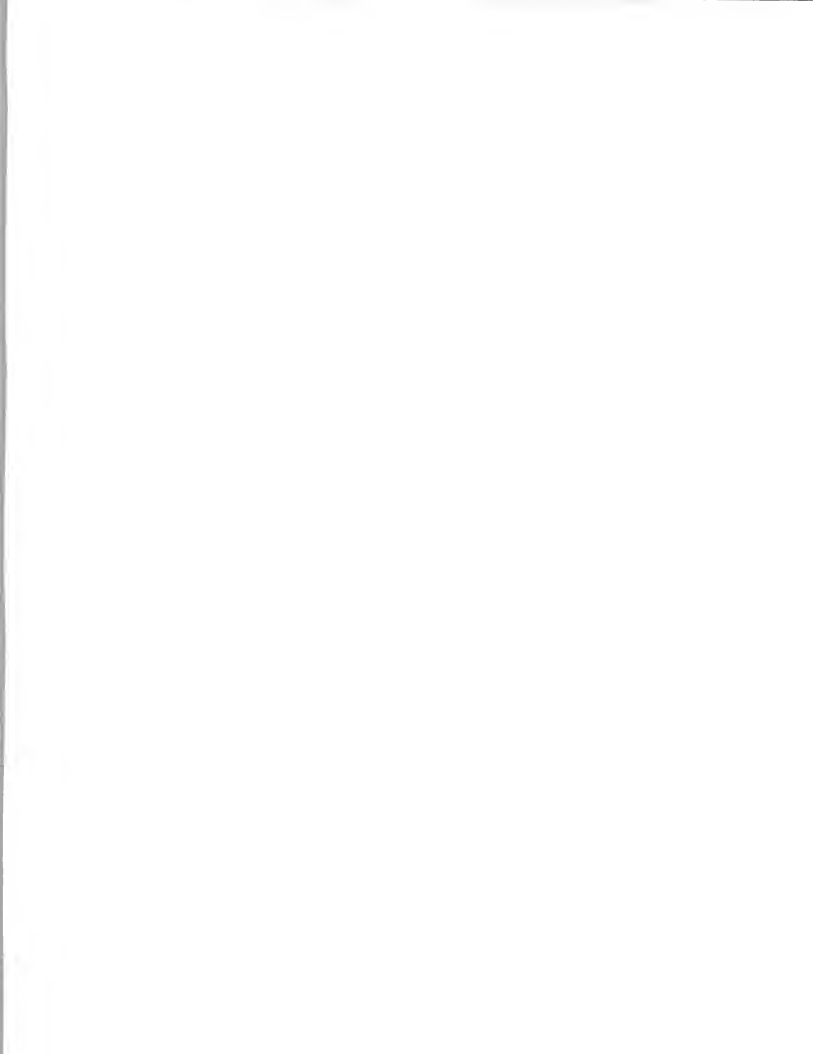


EXHIBIT II-8

NCR Corporation's Total Company and Service Revenue Growth



PRIME COMPUTER, INC.

Prime Park
Natick, MA 01760
(508) 655-8000

James F. McDonald, President and CEO
Kathleen A. Cote, Vice President,
Worldwide Services
Total Employees: 12,386
Total 1988 Revenue: \$1,595 million
Total 1988 Service Revenue: \$537 million

The Company

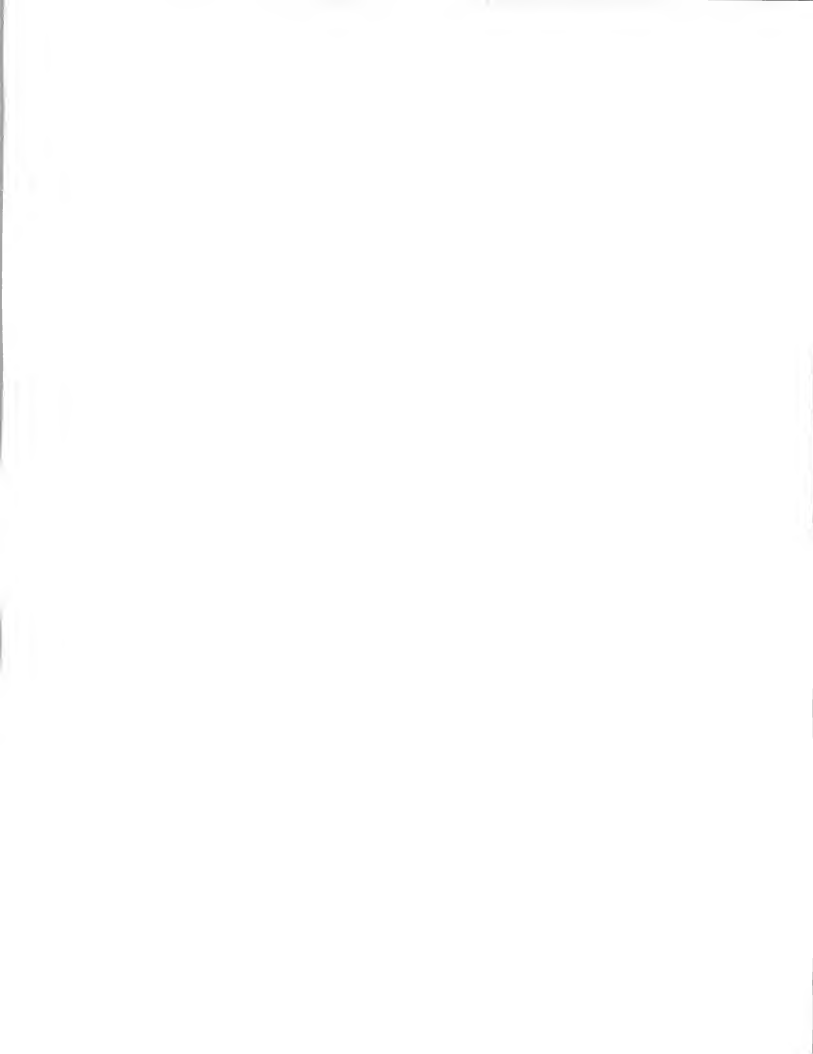
Prime was founded in 1972 to create a super-minicomputer capable of supporting many users and tasks simultaneously, directed at the scientific and engineering community. By 1987 the company had reached annual sales of \$960 million.

In 1987, the company took on over \$400 million in long-term debt to finance the acquisition of Computervision, a specialist in systems for the CAD/CAM market sector. Prime's growth, coupled with the acquisition of Computervision (completed as of February 5, 1988), propelled the company to sales of \$1.6 billion in 1988, but profitability was impacted unfavorably due to the need to restructure operations to absorb the \$500 million (sales) acquisition. The company also acquired GE's Calma Company during 1988.

The company has more than 23,000 computer installations worldwide, and enjoys long-standing relationships with customers such as Carrier Corporation, the U.S. Navy, Ford Motor Co., Aerospatiale and General Electric. In the workstation market, Prime develops, manufactures and markets workstation platforms together with Sun Microsystems to service Prime's primary markets. The company recently signed a \$200 million, two-year OEM agreement with Sun for SPARC-based systems running UNIX. Prime professes to be the world's second-largest supplier of CAD/CAM products and solutions.

The company also boasts of its Prime INFORMATION data management and application development software which has made it number one in the \$1 billion-plus PICK systems marketplace.

Prime's small computer business accounts for about one-third of its revenues, CAD/CAM another one-third, and service accounts for the remainder. Computer systems are believed to account for most of Prime's \$537 million service revenues. Beginning in late 1988, MAI Basic Four attempted a hostile takeover, which was finally resolved in August 1989 when J. H. Whitney took control and began unfolding a restructuring plan for the besieged computer vendor. Whitney's prior venture capital investments include Storage Technology, Applicon, Compaq, Cypress Semiconductor, Sungard Data Systems and Decision Data. Whitney has taken the company private, and is reorganizing into three major business units: minicomputers, CAD/CAM and services. The company also plans to form a federal systems division, focused on



improving government sales; the company also hopes to increase its systems integration business.

President James McDonald has been quoted as being interested in expanding the company's service business as well, taking on other manufacturers' products and systems along with its own. Details about this strategy are not yet available, however. Prime is apparently developing a new service program for Sun Microsystems' VARs on the CAD/CAM side of the business, but in view of the OEM relationship between Sun and Prime, that can hardly be the first indication of a serious third-party maintenance thrust.

In October, the company announced workforce reductions of about 20%, which will take total headcount down below the 10,000 level, to approximately 9,500 employees.

Service Demographics

Prime employs approximately 3,700 service personnel working from about 300 different locations, worldwide. Of these, 1,630 are direct CEs or FEs. Average revenue per service employee is \$145,135, much better than industry averages. It is easy to see how attractive Prime's service business is from an acquirer's perspective.

U.S. services revenues totaled \$279 million in 1988, growing a modest 3%. On a worldwide basis service revenues grew about 8% in 1988, compared to 1987. The company also employs 170 software support representatives around the world.

Service Delivery

The company's standard hours of coverage are from 7 a.m. to 7 p.m., 5-days-per-week. The company offers either two-hour or four-hour response time commitments depending upon whether a standard offering or a premium service is desired by the user.

The company offers three-year contracts for its CAD/CAM services at a 10% discount from normal list price. Volume discounts are also offered. Occasionally, in the case of very large hardware procurements, custom service terms, conditions and discounts are negotiated.

The company will pay a VAR or business partner an 8% commission for maintenance contracts obtained, based on the first year's maintenance revenue only. Software support for Prime computer products is unbundled, available for a monthly fee. Software support related to the Computervision product line is bundled with software license fees. The company does not provide support to independent third-party service organizations.

**Strategic
Commentary**

Hardware maintenance is clearly not a likely source for significant added revenues, unless the base of new Prime products expands sharply during the near future. Industry pressure on maintenance prices will dampen revenues, and customer pressure for broader, worldwide service support will threaten Prime's ability to contain service costs.

A major opportunity probably lies in the area of software support services and multi-vendor support for other manufacturers products. It will be interesting to see whether Whitney attempts to align Prime's service customers with other, separate Whitney investment ventures, or whether Prime can expand its service programs without violating needs for cash flow to pay down the debt assumed to make the acquisition.

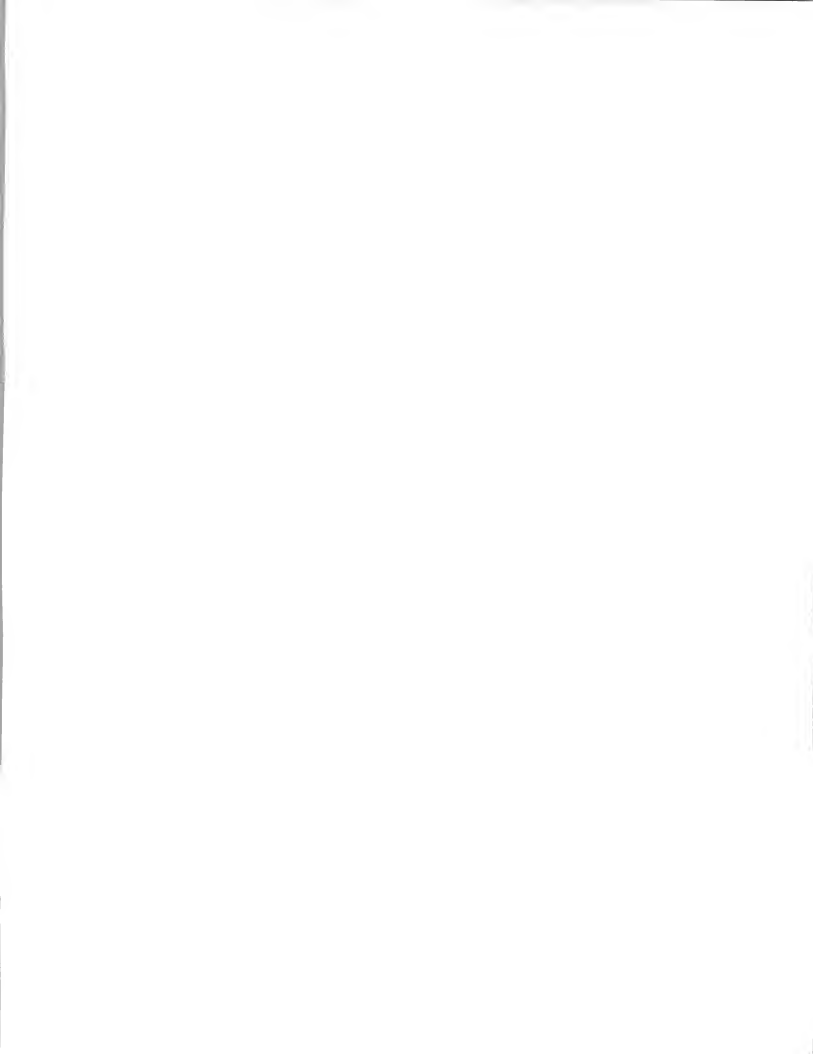
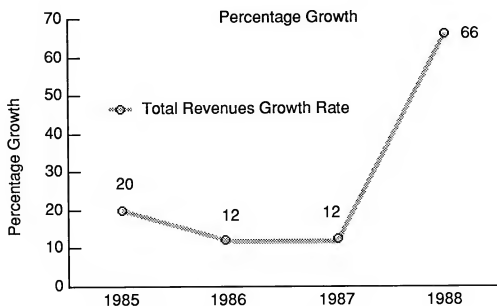
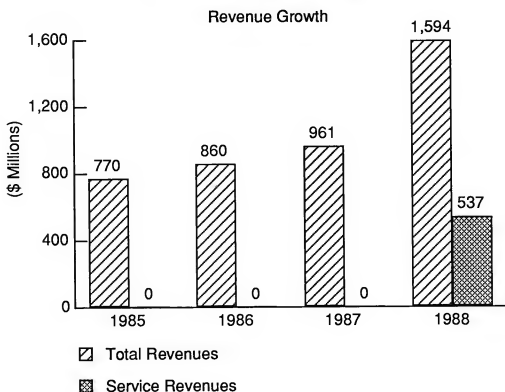
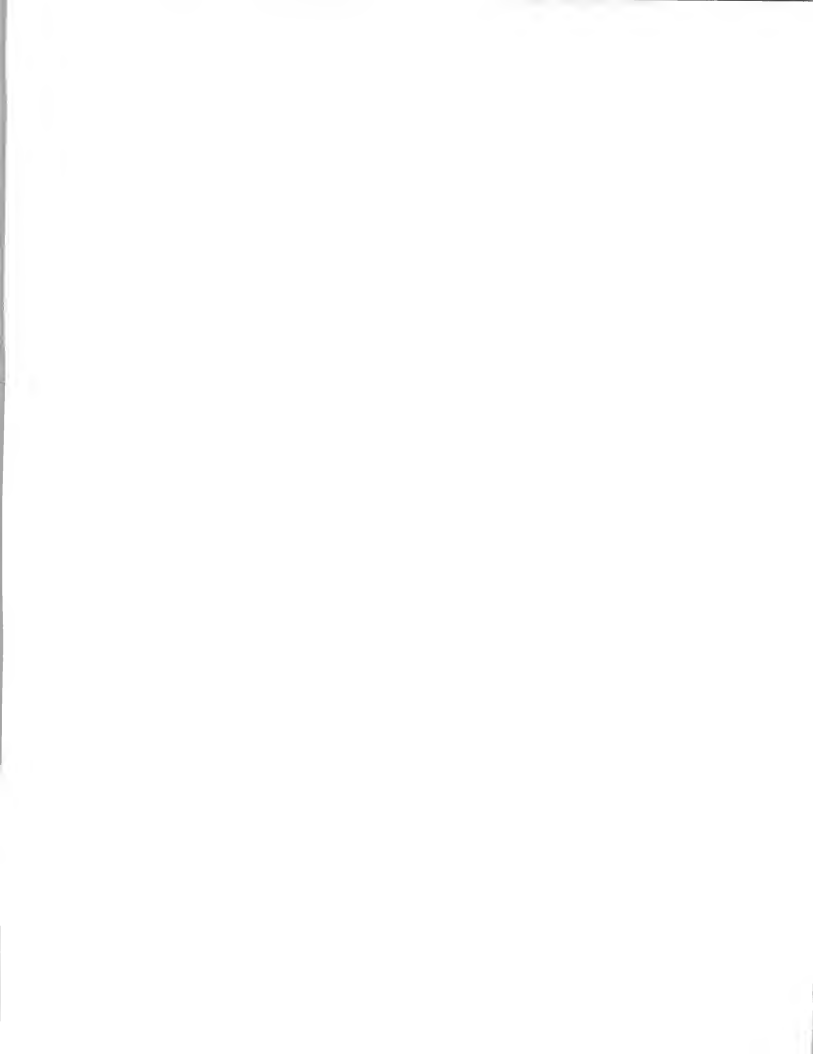


EXHIBIT II-9

Prime Computer, Inc.'s Total Company and Service Revenue Growth



TANDEM COMPUTERS, INC.

19333 Valco Parkway
Cupertino, CA 95014
(408) 725-6000

James G. Treybig, President and CEO
Robert C. Marshall, COO & Customer
Service Group Senior Vice President
Total Employees: 8,624 (9/30/88)
Total FY 1988 Revenue: \$1,314 million
FY 1988 Service Revenue: \$235 million

The Company

Tandem Computers, Inc., is a leading supplier of on-line transaction processing systems and enterprise-wide networks. Founded in 1974, the company's systems run ATM and point-of-sale networks, stock exchanges, factories and other enterprises where hundreds of business transactions much be processed each second and recorded instantly.

Through its wholly owned subsidiaries Ungermann-Bass, Inc. and Atalla Corporation, the company provides additional products for enterprise-wide networks and security applications. Tandem's wholly owned subsidiary Tandem Telecommunications Systems, Inc. is developing network services software for the telecommunications industry.

Tandem revenues grew by 26% in 1988, due primarily to increased shipments of hardware and software and in part to six months of revenues from Ungermann-Bass included in consolidated FY 1988 sales. U.S. revenue growth was 11%, European revenues grew 46%, and non-European countries contributed 43% year-to-year increases. The company now derives 50% of revenues from outside the U.S. Operating margins were lower during 1988 primarily as the result of high cost of revenue, additional R&D spending, and amortization of costs related the acquisitions during the year.

Financially, 1989 promises to be a good year; the third quarter of calendar 1989 (fourth quarter FY 1989) earnings were up 31% over the comparable period in FY 1988. Service revenues grew 34.3% in 1988, following a 27.7% increase the prior year. Gross margins on service remained stable at 24.7%.

**Service
Demographics**

Tandem employs approximately 2,000 hardware and software service personnel worldwide, about half of which work within the U.S. Tandem operates approximately 130 service points around the world, of which about 80 are facilities within the U.S.

Tandem operates five System Support Groups located in Reston, VA; Sunnyvale and Cupertino, CA; and Frankfurt, Germany; and a Customer Assistance Center in Austin, TX. The SSGs provide operating system support, data communications and subsystems troubleshooting assistance. SSG Operations in Cupertino is headquarters for computer operations and maintenance, applications development, technical services and the Customer Support Call Center.



The CAC in Austin handles service requests, logging all calls for service in the Automated Call Tracking (ACT) system. CAC personnel provide telephone support for small-system products, while large systems support is provided through the SSGs.

In February 1989, Tandem announced a new Multivendor Support Services Program under which Tandem will continue to service and support its mainframe-class NonStop computer systems and Diebold will provide, under a nationwide service agreement, support for Tandem and non-Tandem products such as terminals, printers, workstations and POS devices. Diebold brings about 2,500 service personnel to the table, and the alliance expands the number of U.S. locations from which Tandem customers may be supported to more than 400.

Tandem and Diebold share a strong presence in financial market segments, and Diebold and Tandem customers will still call a single Tandem number for support, and Tandem support procedures will permit call tracking throughout the entire service process to and including closure.

Service Delivery

Tandem is a pioneer in NonStop processing using expert systems techniques to fault isolate and diagnose problems without user intervention or hand failures. The Tandem Maintenance and Diagnostic System (TMDS) often detects failures before they affect system performance in any way.

TMDS monitors component states and system environments, capturing irregularities in an event log. TMDS activates fault analyzers that examine the event log, submit entries to a set of "if-then" inquiries, report critical events to system operators, and sometimes guides parts replacement. TMDS is linked to a Remote Maintenance Interface (RMI) that, optionally, auto-dials the Tandem National Support Center. At the center, Tandem support specialists maintain a service problems-and-solutions data base used to improve TMDS software fault isolation and correction capabilities.

On newer equipment, TMDS and RMI can detect out-of-specification temperature conditions, malfunctioning disk or tape controllers, and faulty fans. TMDS can also test power supplies, clocks and batteries. On many systems the diagnostic process is coupled with hardware and software on a dedicated, fault-tolerant bus, so diagnostic data cannot interfere with applications processing.

Full on-site maintenance is available for large, critical applications. The standard coverage is normal business hours, and can be expanded to include 24 x 7. Service coverage and response times may be customized to schedule preventive maintenance, ECO installations, and other service activity during non-prime operating hours. A resident CE program is also available.

Tandem also offers shared service options in which the customer may work with Tandem's central support facility to fault isolate, but the customer installs needed repair or replacement parts. A cooperative arrangement is available in which the CE would handle preventive maintenance and assist the customer in performing remedial service.

Strategic Commentary

Tandem appears to be directing its product strategy directly at the heart of IBM's mainframe business, announcing in October 1989 a new Cyclone series which would compete head-to-head with IBM's 3090 product line. Instead of taking only the OLTP portion of the customer's business, Tandem is apparently positioning to handle it all.

The company's alliances with Volt Delta Resources and Westinghouse Electric's Electronic Systems Group seem to be Tandem's initial foray into the expanding systems integration field.

Rather than invest substantial sums in an expanded field service organization to handle the myriad of multivendor products which customers use in a typical SI environment, Tandem is teamed with Diebold which already has a major multivendor service program in operation. The only question seems to be what Tandem will do for similar alliances outside of the U.S.

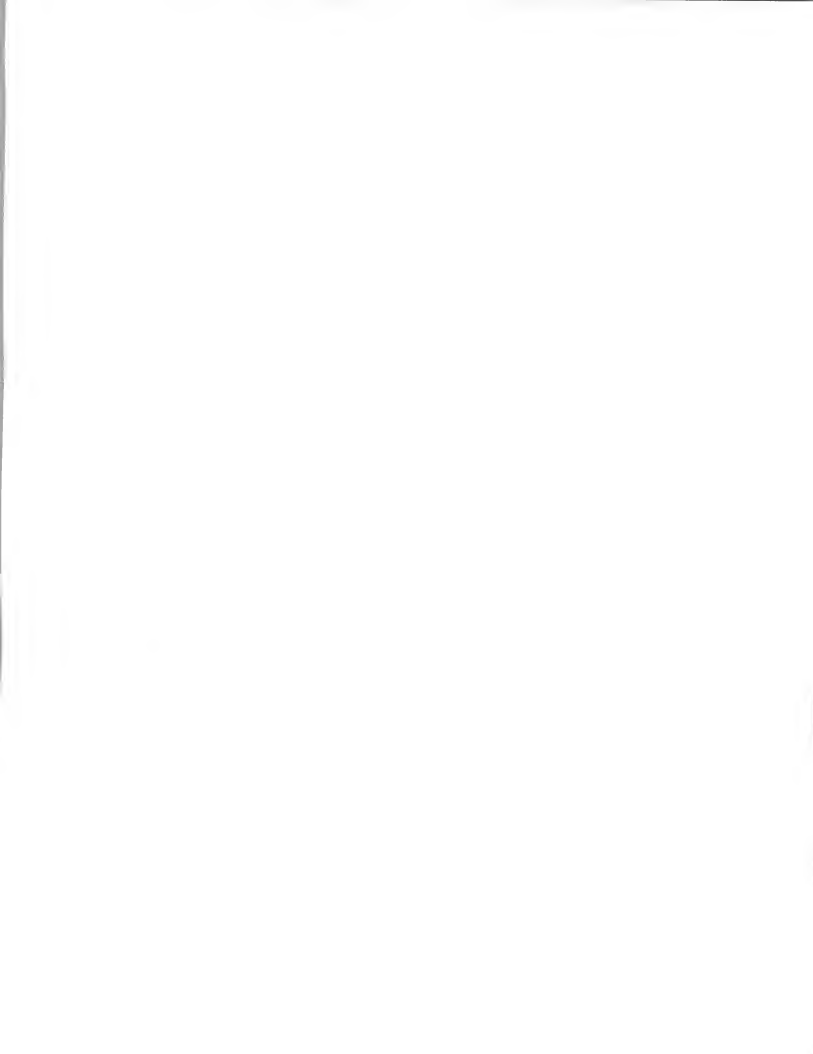
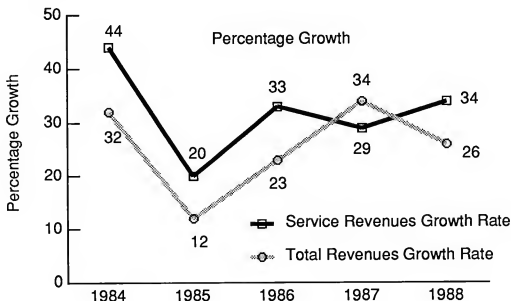
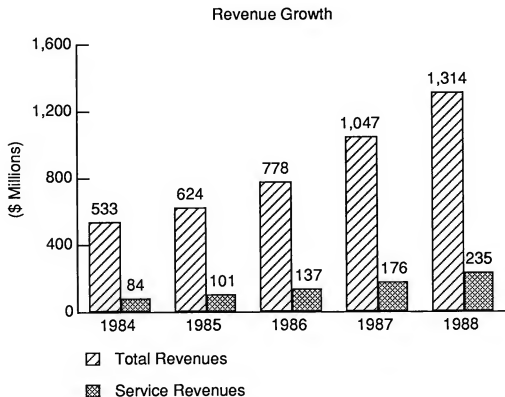
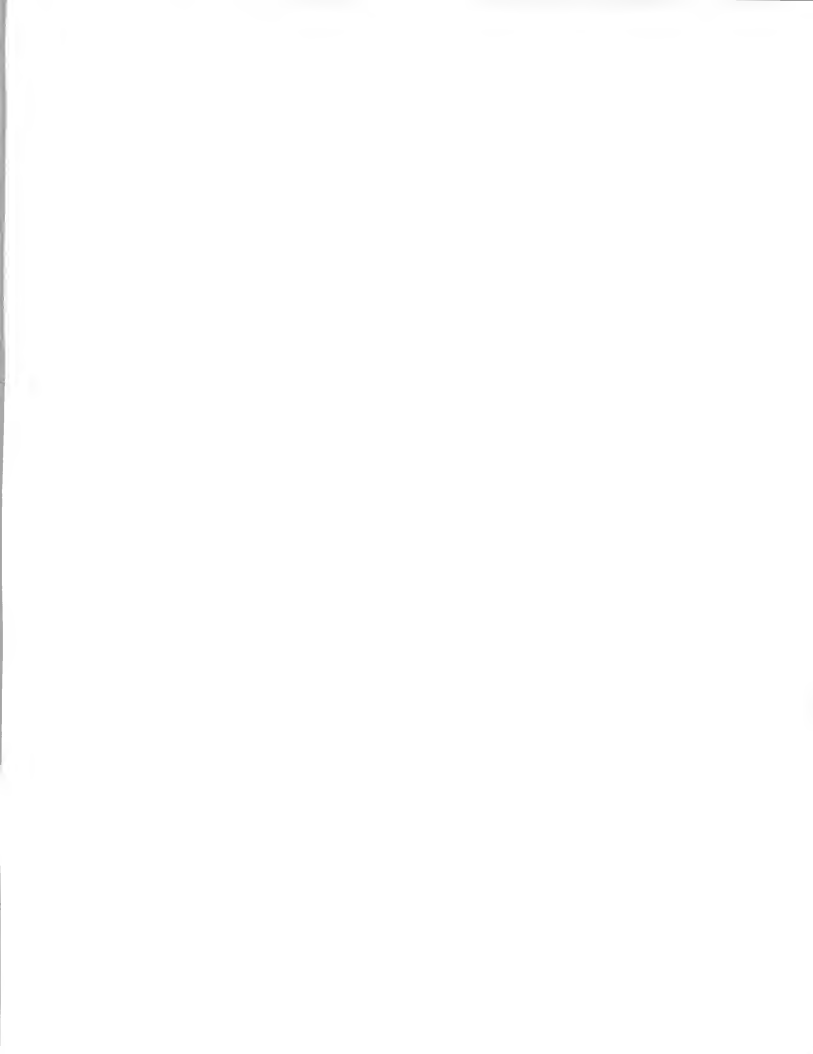


EXHIBIT II-10

Tandem Computers, Inc.'s Total Company and Service Revenue Growth



WANG LABORATORIES, INC.

One Industrial Avenue
Lowell, MA 01851
(508) 967-1095

Richard Miller, President and COO
Raymond C. Cullen, Jr., Senior Vice
President, Customer Services
Employees: 31,516 (6/30/88)
FY 1988 Revenue: \$3,068 million
FY 1988 Service Rev.: \$1,020 million*
* Equipment and software maintenance

The Company

Wang Laboratories designs, manufacturers and markets computer systems, and provides related products and services, used primarily for data and text processing, and other image and voice processing functions. Wang products provide extensive communications capabilities, and may be incorporated into networks of interconnected systems.

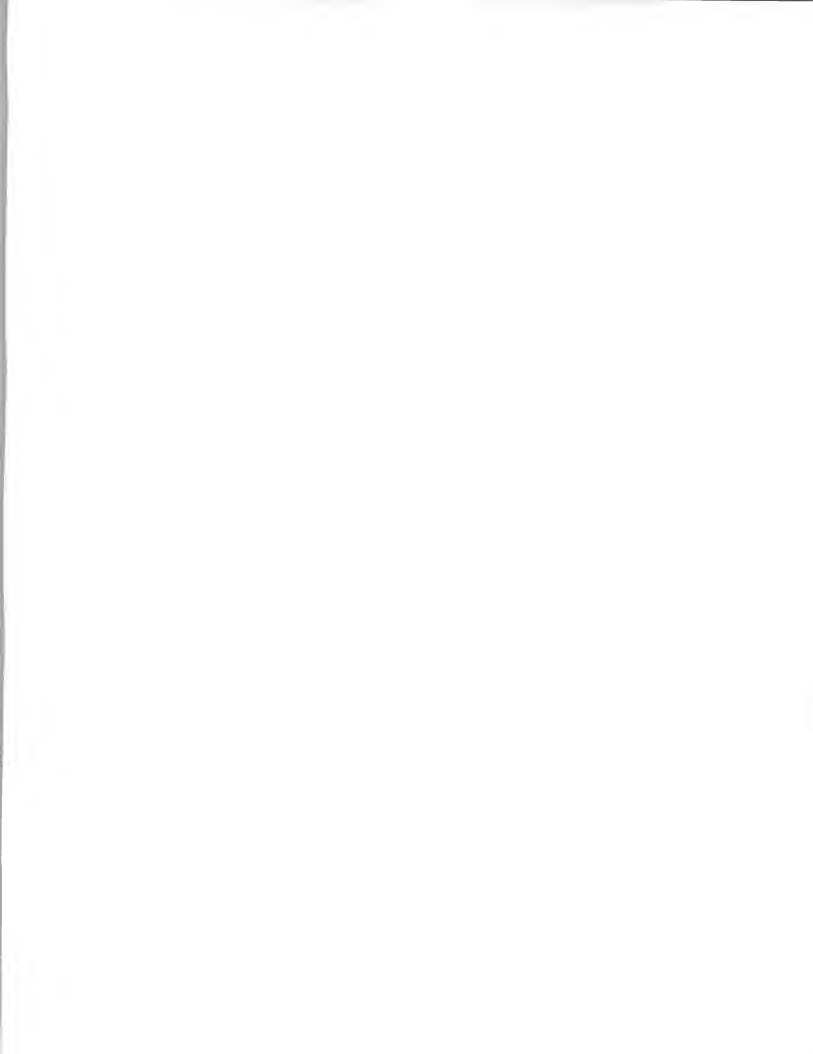
The company reports it is focusing upon a number of key market segments in which significant growth opportunities are perceived: financial services, government, legal, manufacturing and professional services.

Wang derives approximately 55% of total revenues from businesses within the U.S. or direct export sales to unrelated companies. Twenty-four percent of its U.S. business comes from the U.S. government and its agencies.

Revenues grew by 8.2% during FY 1988, and income returned to positive figures after a loss in FY 1987. Service revenues grew by 16.3%, partially due to separate charges for software maintenance begun during FY 1987. Gross margins on services were a healthy 42.9%; Wang held its absolute cost of services constant between FY 1987 and FY 1988, resulting in a major improvement in margins for this important segment (33.5% of total revenue) of its business.

However, FY 1989 has been extremely unkind to Wang. Total revenue has slipped by about 6% for this year compared to last (13% decline during the most recent quarter), and the company's losses for FY 1989 were \$423.4 million. In March 1989, the company began a series of layoffs, some of which directly impact the service organization, expected to drive headcount down well below the 24,000 level. Additional action in December 1989 has suggested that total Wang headcount will be at approximately 21,500 by midyear 1990.

Service revenues have begun to erode as well, which is being attributed to new products being more reliable, and service offerings on older products being up against increased price competition from third parties as well as newer replacement products. FY 1989 services revenues are 5.1% lower than those for FY 1988, especially distressing because of the attractive margins Wang has enjoyed from its service business. Further erosion in hardware maintenance revenues of slightly more than 7% per



year are expected to be overcome through double-digit growth in software support and ancillary services revenues.

In FY 1989 (year ending June 30, 1989), U.S. service revenue was \$550,700,000. Over 90% of Wang's current U.S. service revenue is derived from hardware maintenance.

To repay debt, reduce interest expense and generate cash for operations, Wang has begun selling miscellaneous nonstrategic assets. Among assets which have been divested are Wang's domestic lease portfolio and that of its Wang Credit Corporation subsidiary. Wang has also agreed to sell certain real estate and excess manufacturing facilities.

Service Demographics

Wang employed approximately 7,600 service personnel worldwide in 1988 before revenues began to erode and employee reduction programs were begun. Current worldwide service headcount might be closer to the 6,600 level. Wang's marketing literature indicates an installed base of over 160,000 systems, of which about 100,000 are U.S. installations. Worldwide, Wang indicates it has over 5,000 trained Customer Engineers assigned to specific geographic locations.

U.S. service headcount is currently at 3,668, of which about 2,376 are CEs in the field. Wang employs about 670 software support personnel, of which 297 operate from field locations. Technical Assistance Centers—located in Lowell, MA; Dallas, TX; and Atlanta, GA—provide technical support assistance for all field personnel. Wang provides hardware repair service from 280 different U.S. locations, of which 78 are primary facilities providing carry-in repair services as well as on-site maintenance.

Regional Support Centers employ about 373 software support professionals. Wang utilizes Regional Support Centers for the initial point of customer contact to provide software support services. On-line systems diagnostics are provided through telecommunications connections with Wang systems. The company utilizes an on-line distribution system for management of worldwide spare parts stocking centers.

Wang employs full-time service marketing reps who work with product/system sales personnel to represent service offerings to customers and resellers. VARs receive a 5% commission on first year service revenue for selling Wang service programs to their customers. CEs are also provided incentives to sell service contracts.

Service Delivery

Wang offers a wide range of hardware and software supports services, plus a number of additional support programs.

On-site hardware maintenance is the most widely used contract option. The plan provides for unlimited repair calls and preventive maintenance performed on a scheduled basis. Extended Service Coverage is designed for contract customers that require hardware repair service beyond normal business hours of 8 a.m. to 5 p.m., Monday through Friday. Extended service is available in nine-, twelve-, sixteen- and twenty-four-hour increments for five, six and seven days a week.

Guaranteed Uptime Plus provides an uptime guarantee of 98% or 99% for critical applications and system configurations. Guaranteed Uptime Plus is offered for core CPUs, core system disks and console workstations, and also includes two-hour guaranteed response times. A 95% uptime guarantee is available in conjunction with a program titled WangCare Guarantee; this option includes a four-hour response commitment.

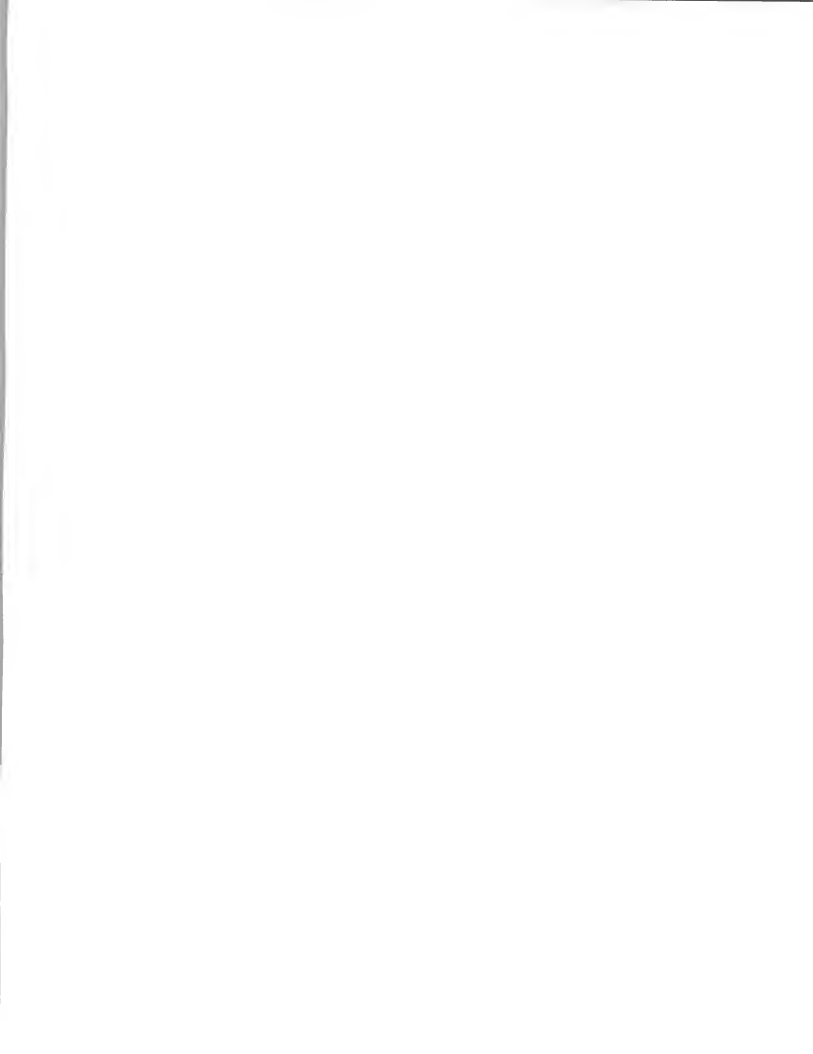
Disaster Recovery is an option for On-site, Depot or Carry-in hardware maintenance customers, and has been included at no additional charge for a six month period of time during 1989, apparently to encourage additional contract business. Disaster recovery features on-site response within four hours, temporary systems on-site within 24 hours, new replacements shipped from Wang within 48 hours, and data recovery and assistance in establishing an alternate processing site.

Carry-in maintenance is an example of a Wang program titled Off-Site Services. Wang also offers time and materials or per-call services.

Wang provides three basic software service offerings, plus several additional software support programs:

- Software Subscription Service is the basic offering, which provides for the distribution of system software updates, including associated documentation. A monthly bulletin is included as part of the program to provide answers to technical questions frequently asked.
- Telephone Support is the intermediate offering, which adds telephone assistance for OS and application programs as well as remote software diagnostics to the basic software subscription service.
- Comprehensive Software Support is the highest level of service. CSS includes on-site software assistance, when required, to the software subscription and telephone support programs.

Wang offers Software Subscription Service for Applications, which provides in a separate program updates and documentation relative to Wang application software such as compilers, data bases and applications. Right-To-Copy permits multisystem users to copy software updates and documentation at a principal site and distribute them to licensed secondary sites.



Wang provides prepayment discounts, annual volume maintenance discounts on service contracts, call screening and self-help desk discounts, and depot maintenance. In addition, consulting services, installation and education programs are available as options for Wang customers.

Strategic Commentary

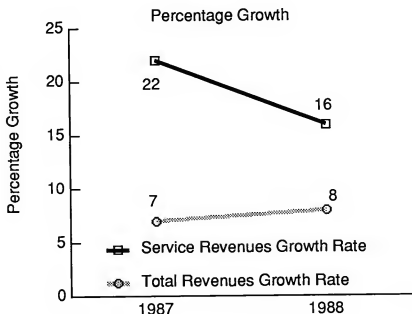
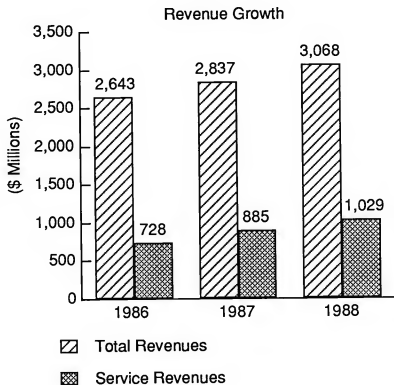
Wang continues to dispose of nonessential assets in order to generate sufficient cash to offset its recent losses from operations. The company is likely to be further disappointed by the near-term financial results of its service business, which is under substantial pressure from third-party maintenance organizations and customers, encouraged by recent competitive activity to reduce prices and offer a broader range of services at little added cost to the customer.

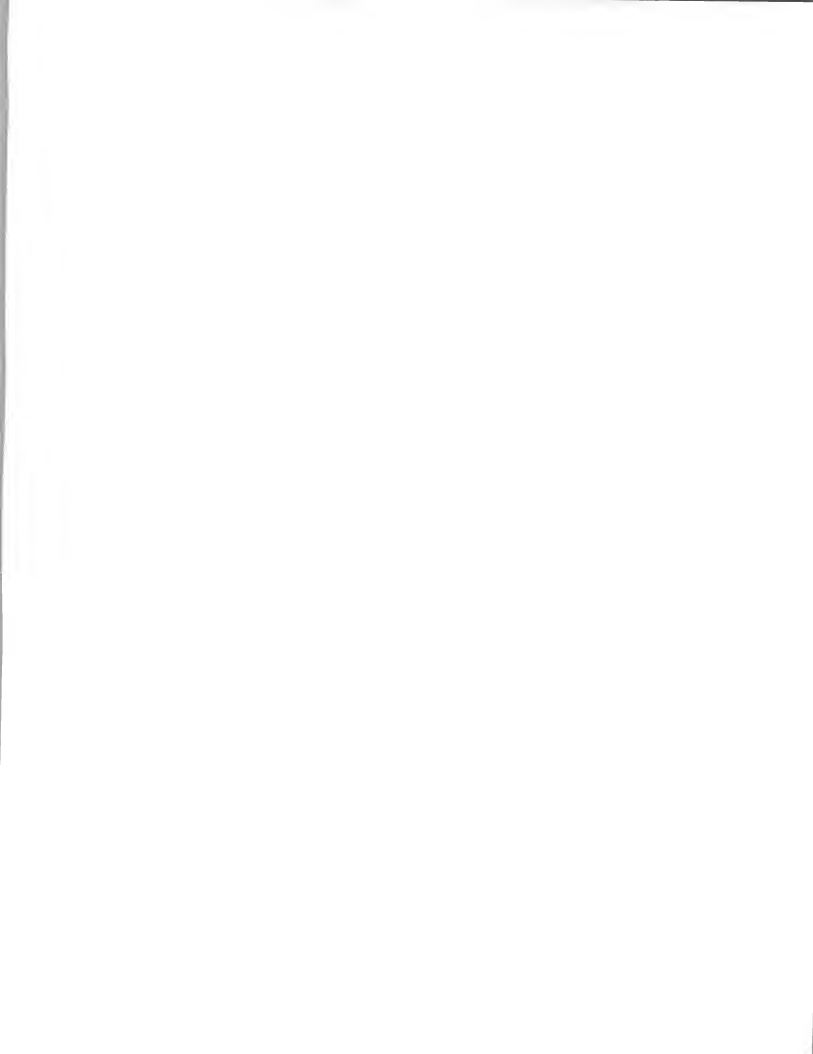
Wang must respond by making its service offerings more attractive and more encompassing, in order to placate its installed base. The company may have to find the cash it needs in other ways and be content with reduced profitability and cash flow from maintenance.

Wang presents a picture of a once-powerful company faced with some very difficult and delicate decisions in the services field.



EXHIBIT II-11

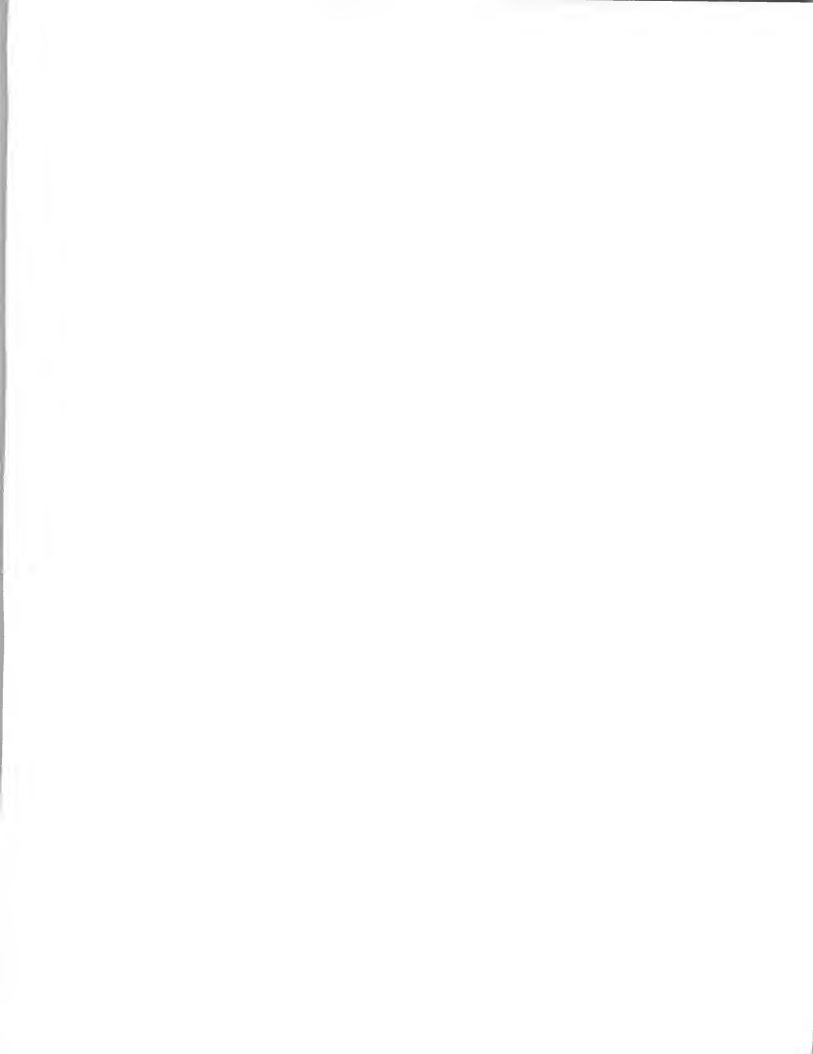
Wang Laboratories, Inc.'s Total Company and Service Revenue Growth





Midrange-Systems Services Vendor Comparative Tables







Midrange-Systems Services Vendor Comparative Tables

EXHIBIT III-1

Midrange-System Vendor Revenue Analysis

Company	Total Company Revenues (\$ Millions)	Growth 1987-1988 (Percent)	Total Service Revenues (\$ Millions)	Growth 1987-1988 (Percent)
AT&T	35,210	4.3	1,491	7.1
Bull HN	2,200	N/A	640*	N/A
Concurrent	340	37.1	106	27.0
Data General	1,365	7.1	451	6.4
DEC**	12,700	21.2	4,552	18.0
Hewlett-Packard	9,831	21.5	1,855	20.5
IBM	59,681	10.1	7,347	-4.5
NCR	5,990	6.2	2,097	5.0
Prime	1,595	65.9	537	N/A
Tandem	1,314	26.0	235	34.3
Wang	3,068	8.2	1,020	16.3

Note: All revenue figures are consolidated.

* INPUT estimate

**Revenue information is for FYE 7/31/89, growth rates reflect FY 1988-FY 1989.

EXHIBIT III-2

Midrange-System Vendor Service Revenue Analysis

Company	Service Revenues (\$ Millions)	Total Service Employees	Total FEs
AT&T	385*	3,616	2,000*
Bull HN**	315	2,300	1,100
Concurrent	106	900	550
Data General	451	1,910	1,500*
DEC	4,552	41,250	28,000
Hewlett-Packard	1,855	15,000	7,000
IBM**	3,102	27,000*	17,000*
NCR	2,097	21,000	15,000*
Prime	537	3,700*	1,700*
Tandem	235	2,700	1,600*
Wang	1,020	7,600	5,000

Note: All revenue figures are consolidated.

* INPUT estimate

** U.S. only

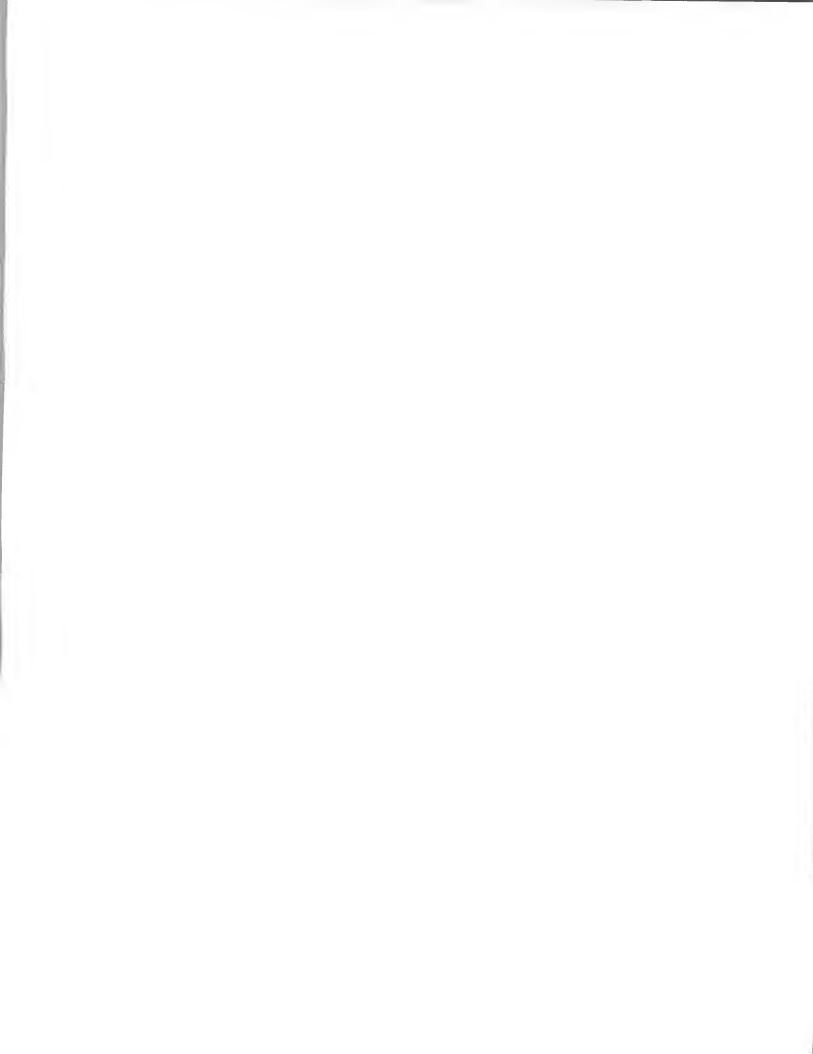


EXHIBIT III-3

Midrange-System Vendor Contract Coverage

Company	Standard Coverage (Hours/Days)			
	24/7	24/5	9/5	10/5 or 11/5
AT&T			X	
Bull HN				X
Concurrent			X	
Data General			X	
DEC			X	
Hewlett- Packard			X	
IBM	X			
NCR			X	
Prime				X
Tandem			X	
Wang			X	

EXHIBIT III-4

Midrange-System Vendor Service Exclusions

Company	Billable Exclusions				
	Customer Error	Product Not under Contract	Software Problem	Alter./ Attach.	Act of God
AT&T					
Bull HN					
Concurrent		X		X	X
Data General	X	X	X	X	X
DEC		X		X	X
Hewlett-Packard					*
IBM					
NCR	Contract-dependent				
Prime		X	X	X	X
Tandem	*	*	*	*	*
Wang	X	X	X	X	X

* Company did not respond.

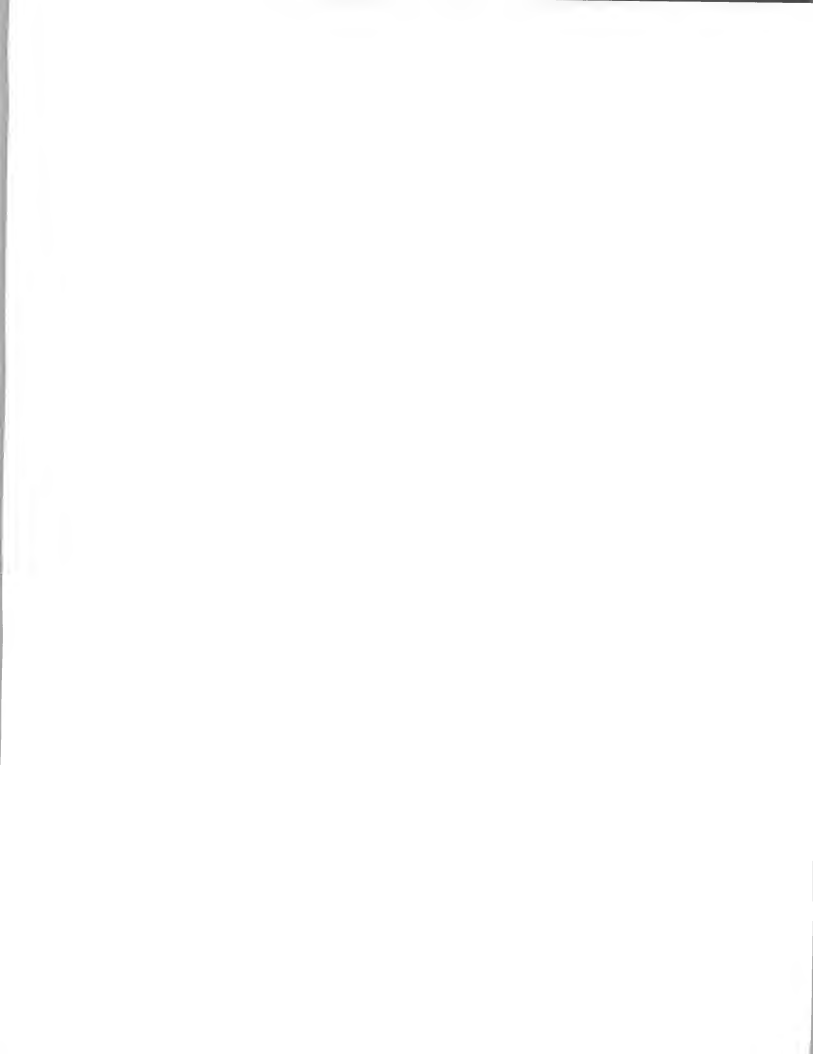


EXHIBIT III-5

**Midrange-System Vendor Hourly Rate for Contract
Customers for Billable Exclusions
and Outside Hours**

Company	Hourly Rate			
	M-F 8 A.M. - 5 P.M.	M-F After 5 P.M.	Saturday	Sunday & Holidays
AT&T	\$100	\$150	\$150	\$200
Bull HN	118	142	142	142
Concurrent	130	150	150	150
Data General	120	150	150	150
DEC	150	150	150	150
Hewlett- Packard	145	145	145	145
IBM	190	190	190	190
NCR	165	215	215	215
Prime	*	*	*	*
Tandem	*	*	*	*
Wang	128	160	160	160

* Company did not respond.

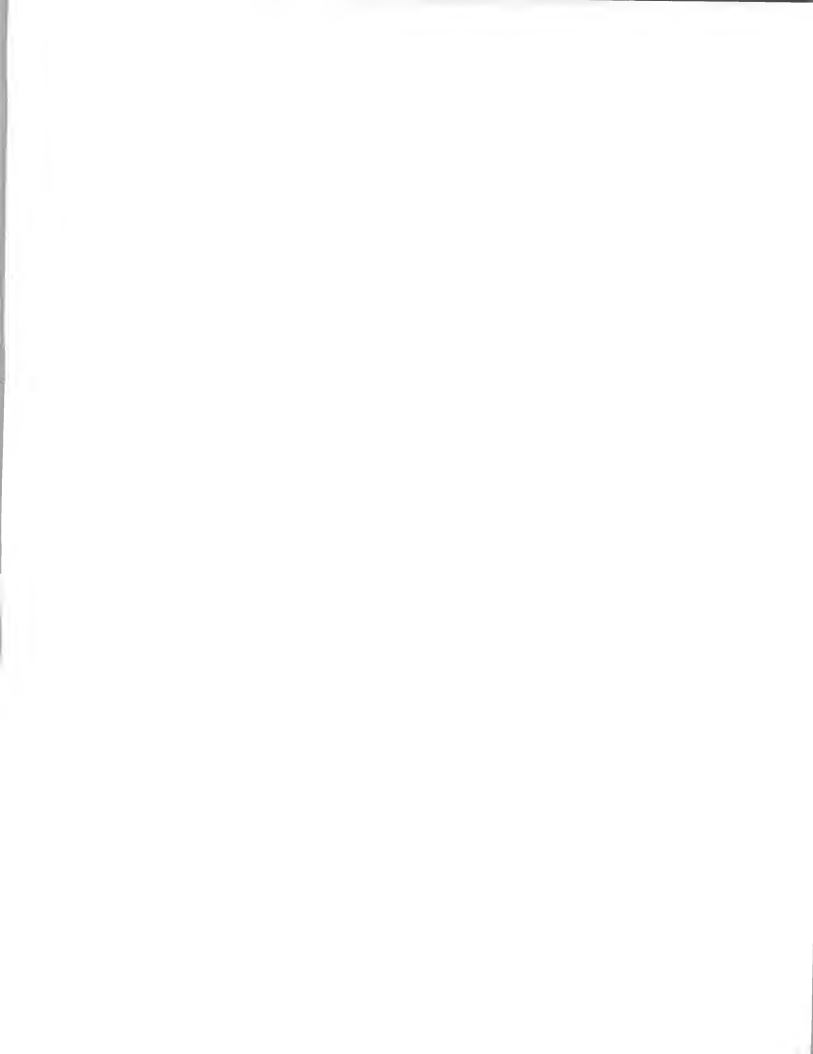


EXHIBIT III-6

Midrange-System Vendor Discounts Multiyear and Prepay

Company	Discounts Available					
	Multiyear			Prepayment		
	1st Year	2nd Year	3rd Year	1st Year	2nd Year	3rd Year
AT&T	X			X		
Bull HN	X	X	X			
Concurrent	X			X		
Data General		5%	10%	5%		
DEC	X	X	X	5%		
Hewlett-Packard	*	*	*	*	*	*
IBM		X	X	X	X	X
NCR		X	X	X		
Prime		X	X	X		
Tandem	*	*	*	*	*	*
Wang		10%	15%	6%		

X - Provides discount, would not divulge discount

* Company did not respond.

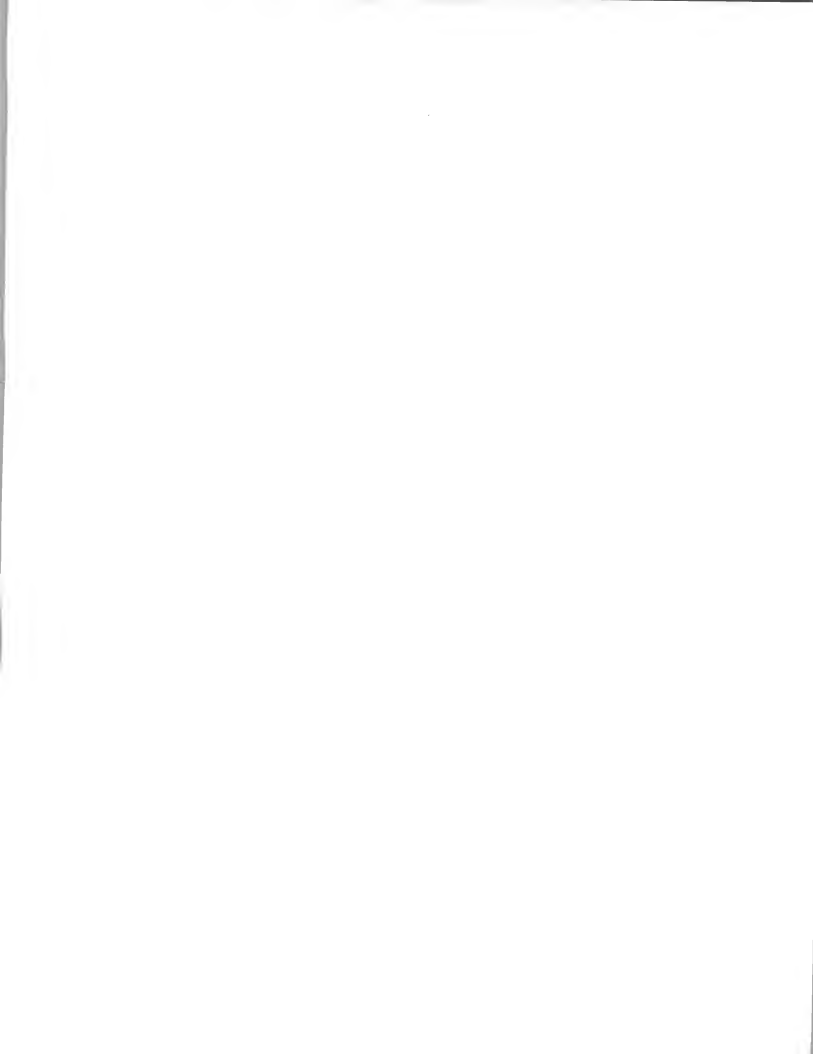


EXHIBIT III-7

Midrange-System Vendor—Other Discounts Offered

Company	Other Discounts					
	Carry-in	Call Screens	Dollar Volume	Unit Volume	Remote Support	Deferred Response
AT&T			X	X		
Bull HN	X		X	X		
Concurrent		X	X	X		X
Data General		X	X			X
DEC	X	X	X	X	X	X
Hewlett-Packard	*	*	*	*	*	*
IBM						X
NCR	X	X	X	X	X	X
Prime	X			X		X
Tandem			X	X		
Wang	X	X	X	X		X

* Company did not respond.

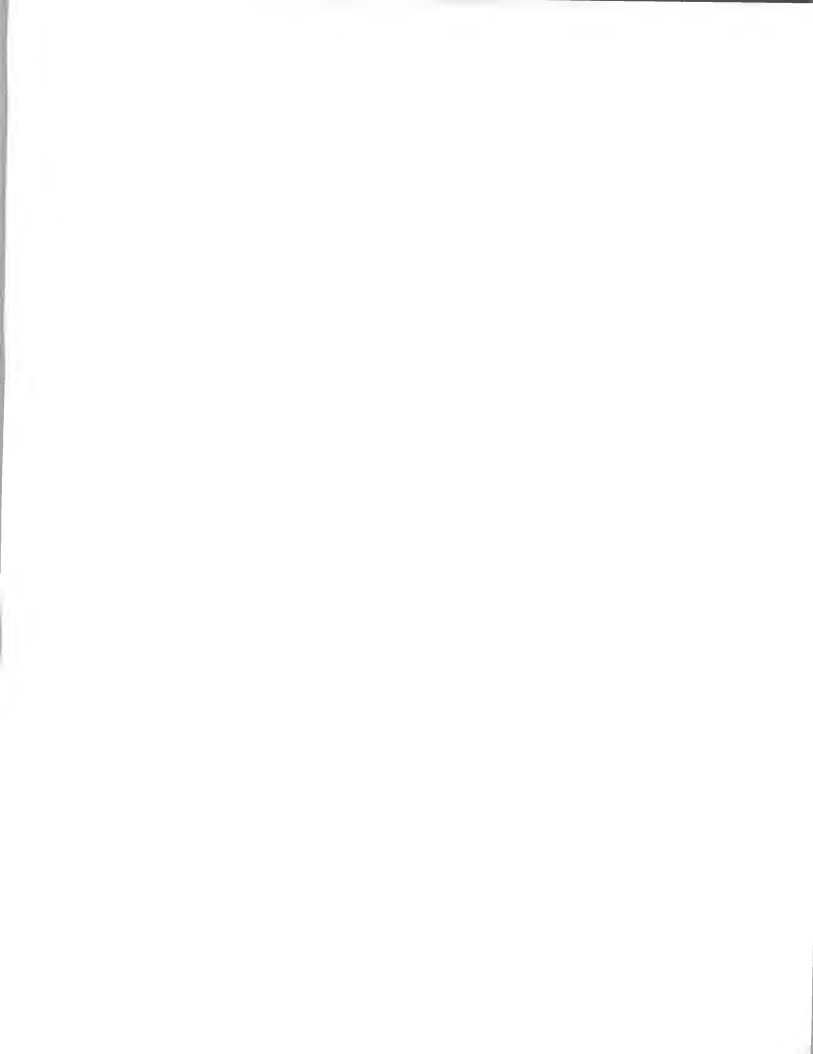


EXHIBIT III-8

Midrange-System Vendor Software Support

Company	Software Support				
	How Performed			How Charged	
	On-Site	Remote	Both	Bundled	Hourly (H) or Monthly (M)
AT&T			X		M
Bull HN			X		M
Concurrent			X		M/H
Data General			X		M/H
DEC			X		M
Hewlett-Packard			X		M
IBM			X	X	
NCR			X		M/H
Prime			X	Variable	M
Tandem			X		N/A
Wang			X		M/H

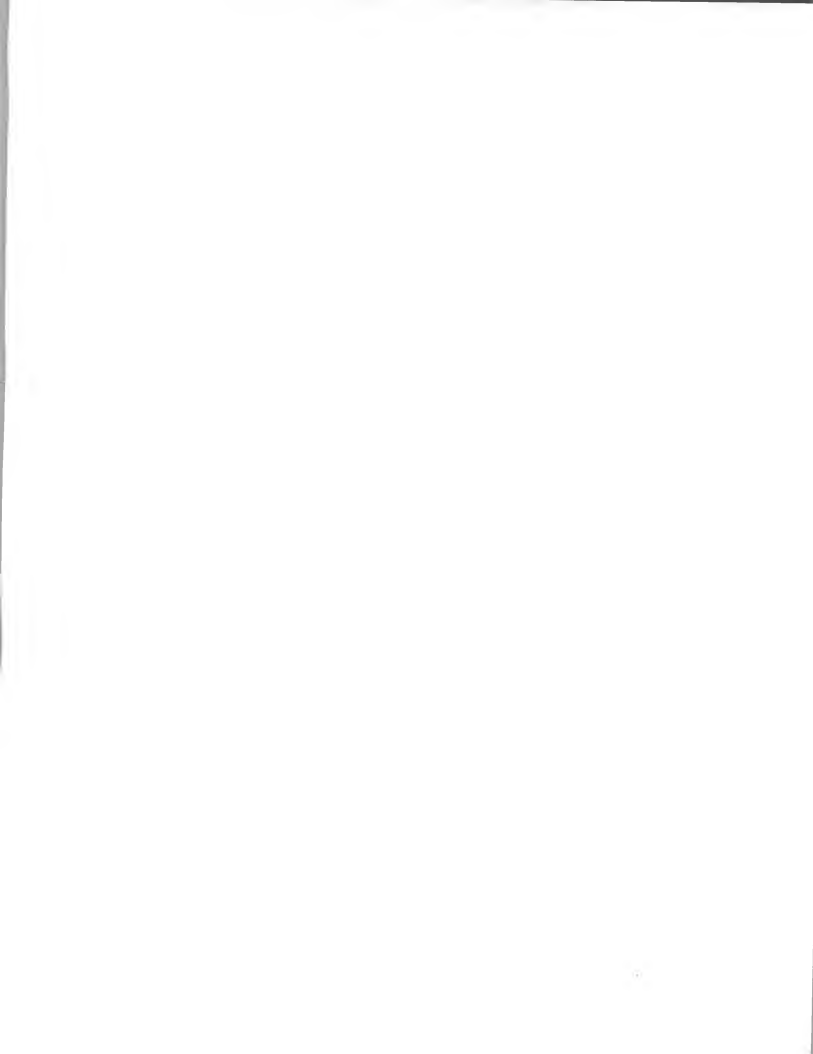


EXHIBIT III-9

Midrange-System Vendor Software Support Discounts

Company	Software Support Discounts			
	Multicopies	Call Screen	Prepay	Multiyear
AT&T	*	*	*	*
Bull HN	X			X
Concurrent	X		X	
Data General	X		X	
DEC	X	X	X	X
Hewlett-Packard	*	*	*	*
IBM				X
NCR		X		
Prime	*	*	*	*
Tandem	*	*	*	*
Wang	X	X	X	

* Company did not respond.

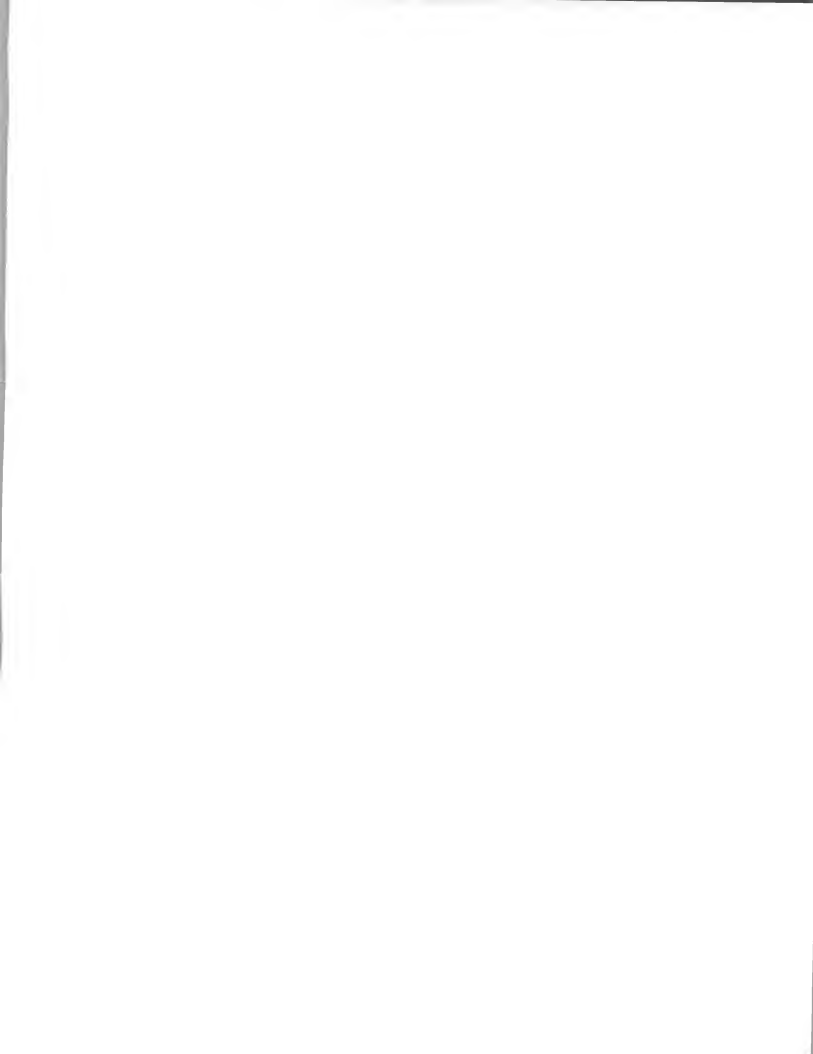


EXHIBIT III-10

Midrange-System Vendor Software Support Provided for Other Equipment

Company	Support Other Manufacturers' Products				
	Peripherals	Workstations/ Micro- computers	Midrange Systems	Large Systems	Software
AT&T					
Bull HN	X	X			
Concurrent	X	X	X		
Data General	X	X			
DEC	X	X	X	X	X
Hewlett- Packard		X			
IBM	X	X	X	X	X
NCR	X	X	X	X	
Prime					
Tandem	X	X			
Wang	X	X			

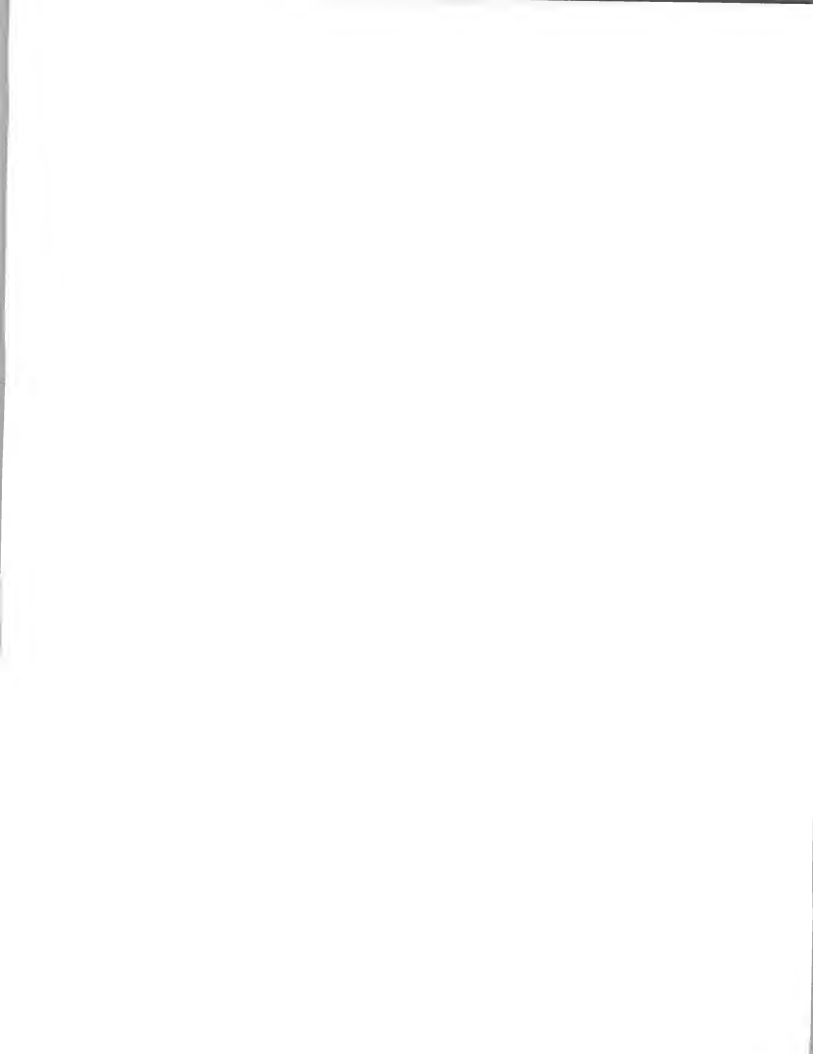
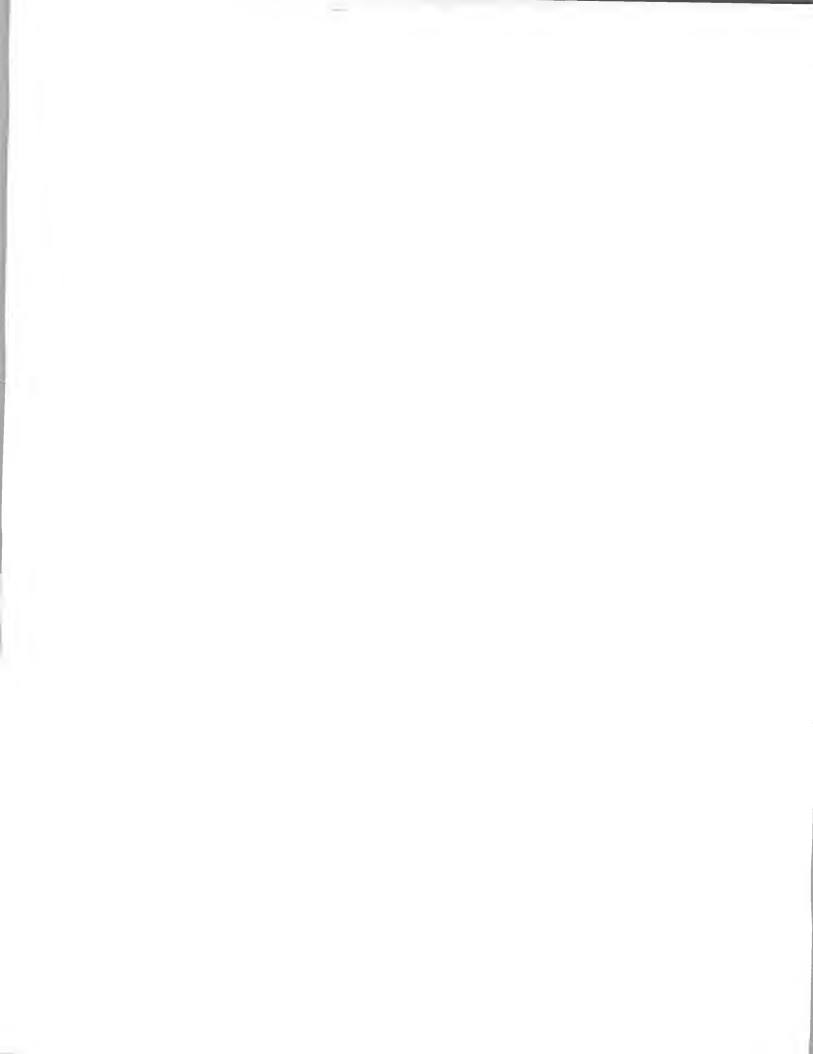


EXHIBIT III-11

Midrange-System Vendor Support Provided to TPMs

Company	Support Provided to TPMs							
	Local Access to Parts	Central Access to Parts	Maintenance Documentation	Engineer Change Orders	Tech. Support All Hours	Tech. Support	Training	Software Documentation
AT&T								
Bull HN	X	X		X	X		X	
Concurrent		X			X	X		
Data General								
DEC		X	X				X	
Hewlett-Packard								
IBM	*		X	X		X	X	X
NCR								
Prime								
Tandem								
Wang		X		X				

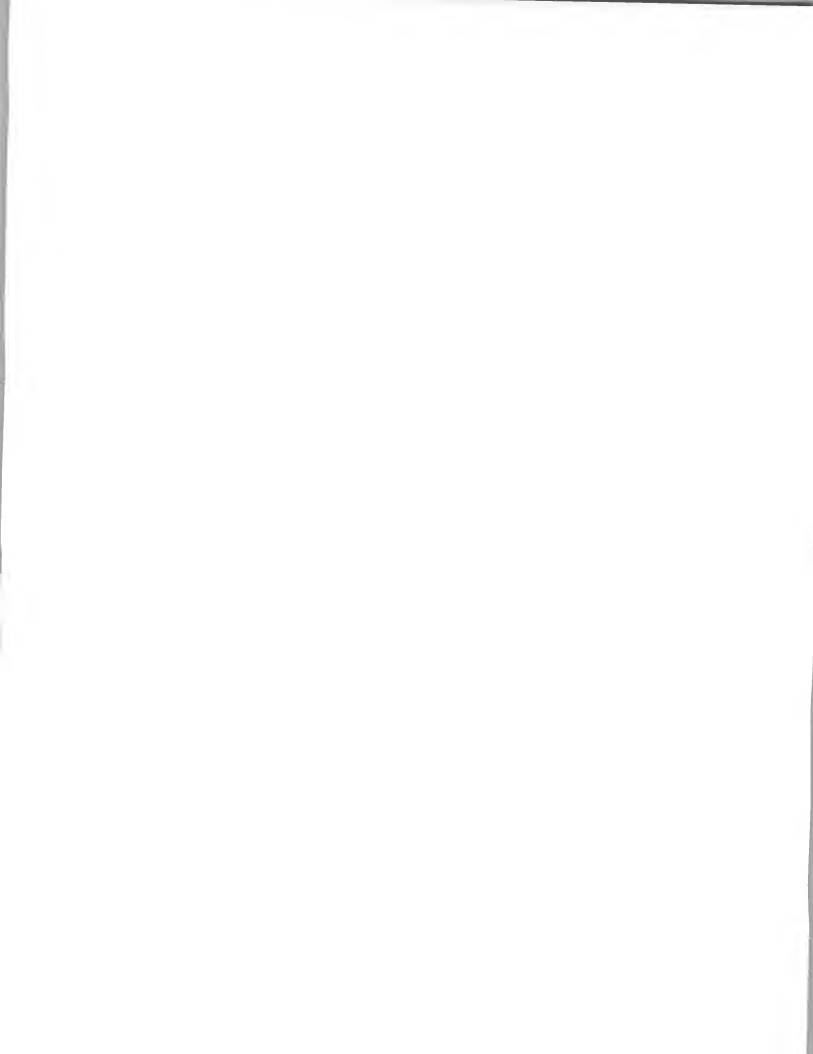
* Major parts centers only





Appendix: Questionnaire







Appendix: Questionnaire

INPUT

Customer Service Program Vendor Survey Information

Manufacturer Name

TPM Name

Address

Persons Contacted

NAME

TITLE

PHONE

1. Demographics

A. Total # of Service Employees
(Field, HQ, Support, etc.)

B. Number of CEs, FEs

C. Number of Program Support Reps

D. Number of Total Field Personnel

- E. Number of Non-Field Personnel _____
- F. Number of U.S. Service Locations _____
- G. Number of U.S. Repair/Exc. Centers _____
- H. Number of Parts Distr. Centers _____

I. What is the geographic coverage of your service?

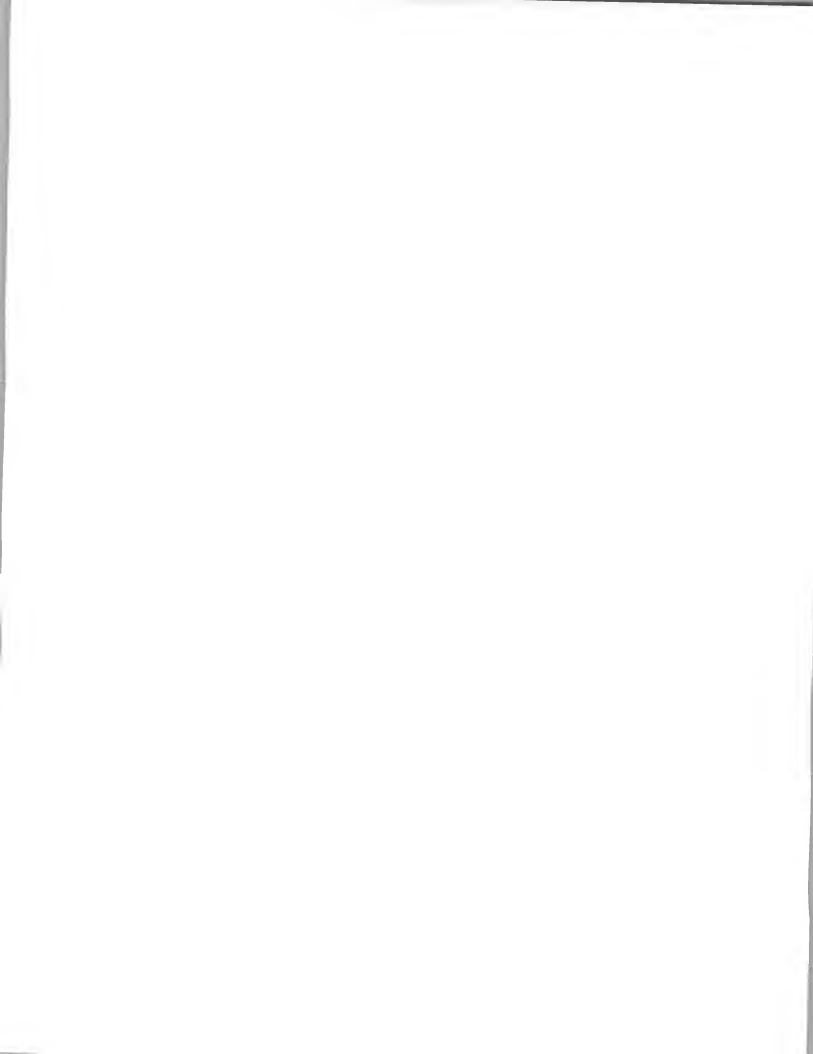
- ☐ NE (ME, VT, NH, NY, MA, CT, RI, PA, NJ, MD, DE, WV, VA)
- ☐ SE (KY, AR, TN, NC, SC, MS, AL, LA, GA, FL)
- ☐ Central (MN, WI, MI, IA, IL, IN, OH, MO)
- ☐ SW (CA, NV, UT, AZ, CO, NM, TX, OK, KS)
- ☐ NW (OR, WA, ID, MT, WY, ND, SD, NE)
- ☐ Noncontinental (AK, HI)

J. Please check the types of products you service:

- ☐ Workstation/PCs
- ☐ Midrange systems
- ☐ Large systems
- ☐ Software

K. Which of the following services do you provide?

- ☐ Manufacturers Warranty
- ☐ Hardware Maintenance
- ☐ Software Maintenance
- ☐ Training for Fee
- ☐ Installation/Relocation
- ☐ Fourth-Party Maintenance
- ☐ Conversion/Upgrade
- ☐ Refurbishment



L. If you are a third party, please list the principal products that you service:

	MANUFACTURER	PRODUCT TYPE	MODEL #(S)
Example:	IBM	Terminals	3270
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____

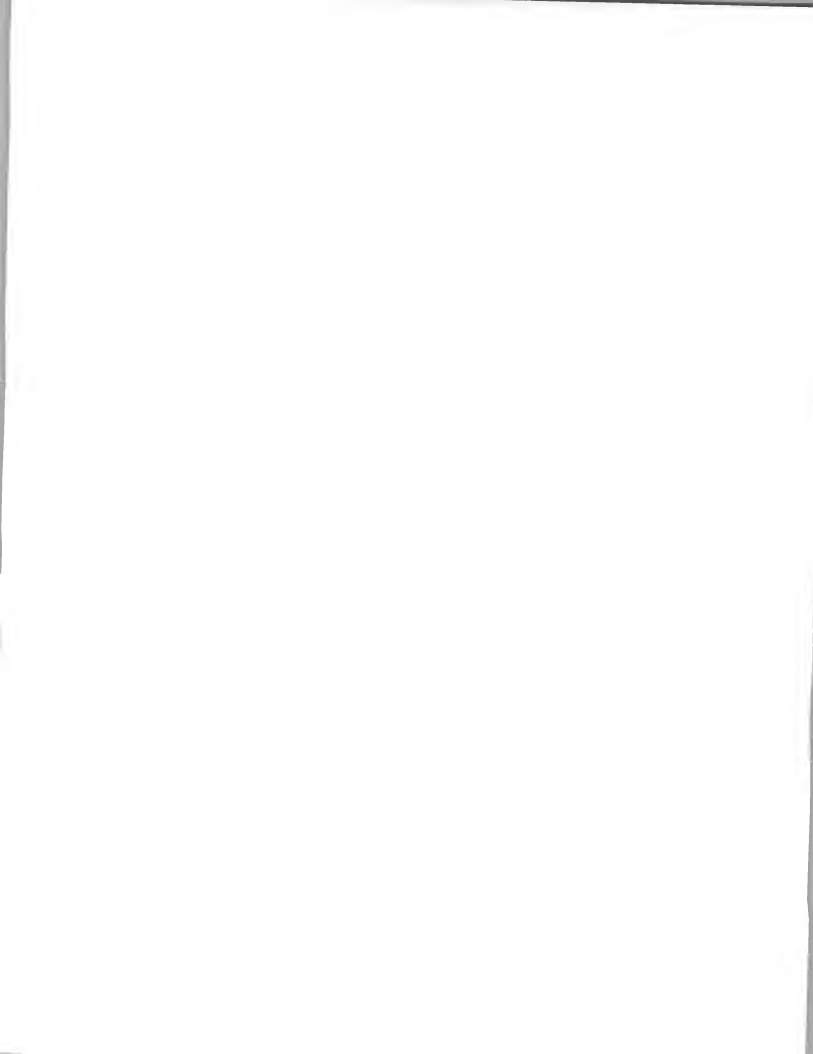
2. Revenue

- A. Total Annual Service Revenue _____
- B. % of Total Revenue from Software Support _____
- C. % of Total Revenue from Professional Support _____
- D. % of Total Revenue from Education Fees _____
- E. % Growth of Total Revenue Last Year _____

3. Growth Opportunities

Please give us your best estimate of the probable revenue growth rates for each of the following major services:

- Hardware maintenance _____%
- Third-party maintenance _____%
- Software support _____%
- Professional services _____%
- Education/Training fees _____%



4. Major Service-Related Problems

A. What do you consider the major service-related problem that your company faces right now?

B. What do you see as the major service-related problem in the next 2 to 3 years?

5. Standard/Base On-Site Hardware M/A

A. Hours of Coverage

24 hrs/7 days/week

24 hrs/5 days/week

9 hrs/5 days/week

11 hrs/5 days/week

Other (Please Describe)

B. Billable Exclusions

Customer Error

YES ☐

NO ☐

Product Not Under M/A (PD)

YES ☐

NO ☐

Software Problem

YES ☐

NO ☐

Alterations/Attach Damage

YES ☐

NO ☐

Lightning/Flood Damage

YES ☐

NO ☐

C. Response Time

Commitment/Guarantee

YES ☐

NO ☐

Objective

YES ☐

NO ☐

RESPONSE TIME

Workstation/PC hours

Midrange hours

Large System hours

D. Travel Time/Expense Exclusions
(i.e., Time & Expense Billable)

No Exclusions _____
 Over 25 miles from Service Office _____
 Over 50 miles from Service Office _____
 Over 75 miles from Service Office _____

E. Price Protection YES ☐ NO ☐

If YES, for how long? _____

F. Hourly Rates for Exclusions and Outside Hours

	Workstation/PC	Midrange	Large
Business hours M-F	_____	_____	_____
After hours M-F	_____	_____	_____
Saturday	_____	_____	_____
Sunday/Holiday	_____	_____	_____

G. Discounts Available

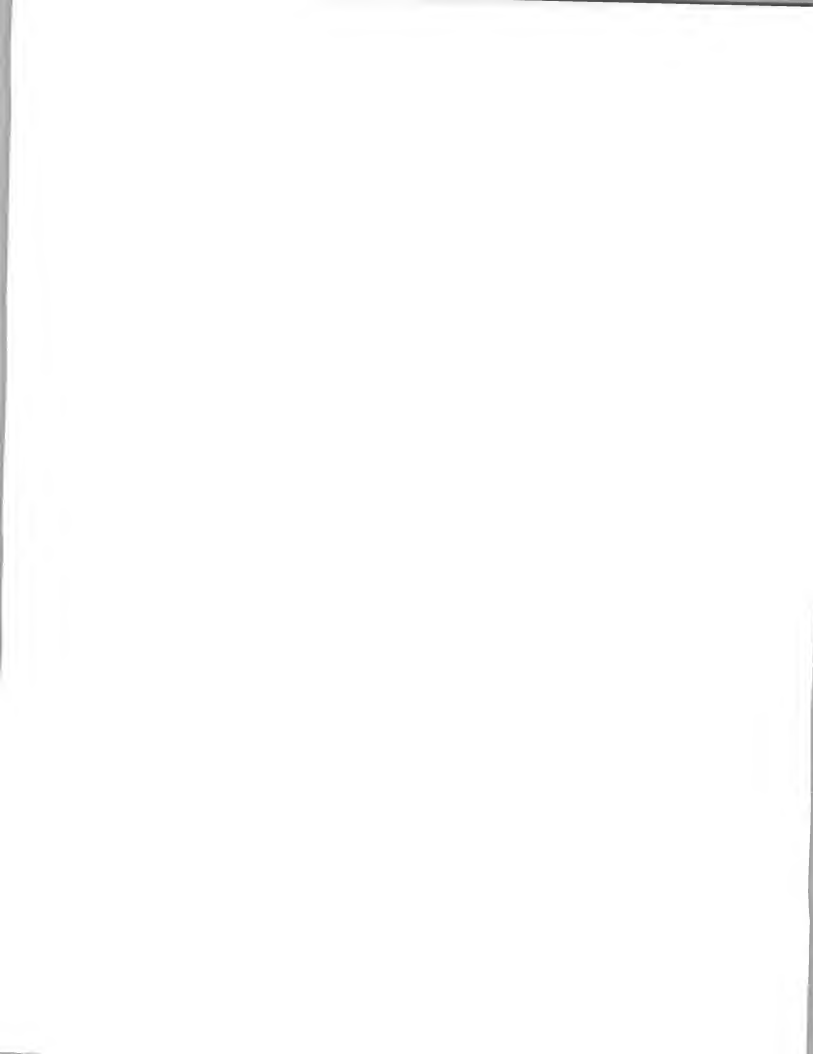
	YES	NO	1 YR %	2 YR %	3 YR %
Multiyear	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____
Prepay	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____

	YES	NO	%	TO	%
Carry-in	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____
Call Screening	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____
Dollar Volume	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____
Unit Volume	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____
Performance	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____
Deferred Resp.	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____
Remote Support	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____

In addition to the discounts above, do you also negotiate discounts with individual customers?

YES ☐ NO ☐

If YES, what types are usually negotiated?



H. For customers not under contract, what are your standard hourly rates during normal business hours Monday through Friday?

Workstations/PCs _____
Midrange systems _____
Large systems _____
Software support _____

I. Do you have a minimum for hourly service?

1 hours _____
2 hours _____
None _____

J. Sales/Marketing

Please select which of the following best describes how the sales/marketing function is handled in your company:

Product Sales Responsibility _____
Service Responsibility _____
Joint Responsibility _____

IF A SERVICE RESPONSIBILITY,
Are full time sales reps used? _____
Or is it a responsibility of the
service manager? _____

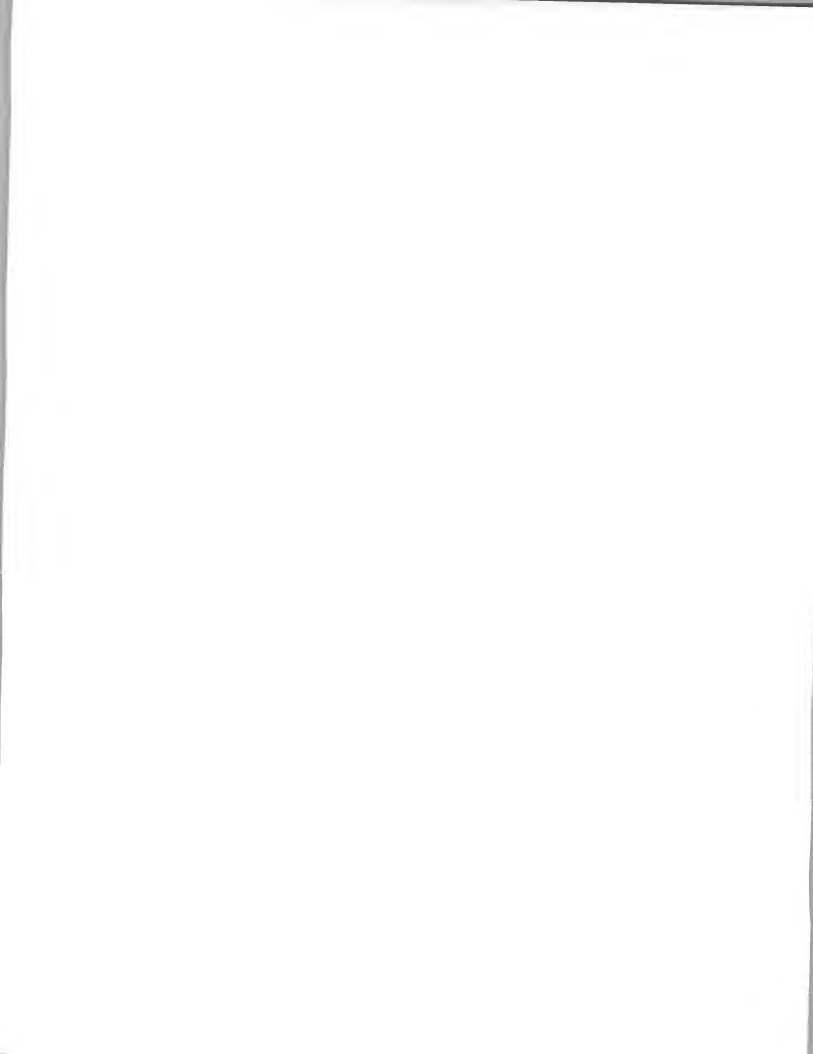
Are incentives provided to the customer engineers to sell service? _____

K. If you are the service organization of a hardware or software vendor, do you support or maintain products not manufactured or marketed by your company?

YES ☐
NO ☐
N/A ☐

If YES please check the categories of products that you support:

Workstations/PCs ☐
Midrange systems ☐
Large systems ☐
Software ☐



L. Software Support

If you are the service organization of a vendor that markets software, do you support it?

YES ☐
NO ☐

If YES, what is the nature of this support?

On-site ☐
Remote ☐
Both ☐

Is this support bundled with the license fee for the software?

YES ☐
NO ☐

If NO:

Do you charge a monthly fee for this service or is it only available on an hourly fee basis?

Monthly fee ☐
Hourly ☐
Both ☐

Do you offer any of the following discounts for software support?

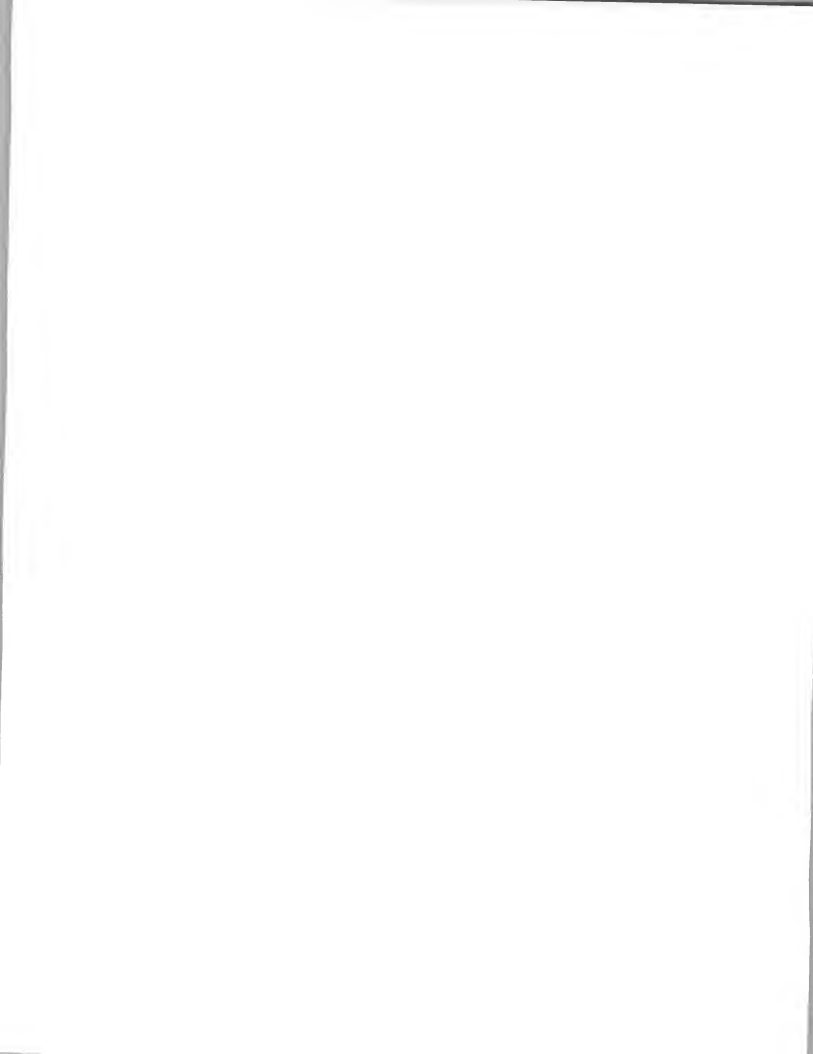
Multiple copies	<input type="checkbox"/>	___% TO ___%
Call screening	<input type="checkbox"/>	___% TO ___%
Prepayment	<input type="checkbox"/>	___% TO ___%
Multiyear	<input type="checkbox"/>	___% TO ___%

If you are a third-party organization, do you offer a software support service?

YES ☐
NO ☐

If YES, what is the nature of this support?

On-site ☐
Remote ☐
Both ☐



Do you charge a monthly fee for this service or is it only available on an hourly fee basis?

Monthly fee ☐
Hourly fee ☐
Both ☐

Do you offer any of the following discounts for software support?

Multi copies	<input type="checkbox"/>	___%	TO	___%
Call screening	<input type="checkbox"/>	___%	TO	___%
Prepayment	<input type="checkbox"/>	___%	TO	___%
Multiyear	<input type="checkbox"/>	___%	TO	___%

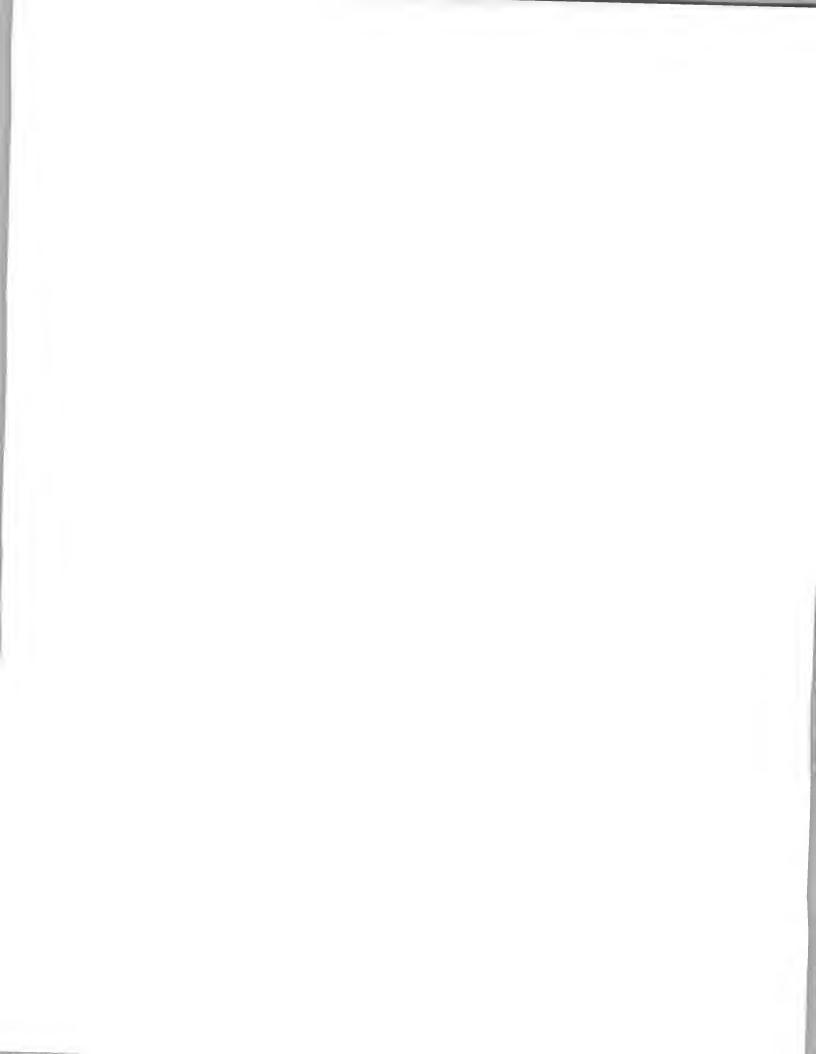
M. Third-Party Support

If you are a hardware or software vendor, what types of support do you offer third parties?

- ☐ Local branch parts availability
- ☐ Parts dist. center availability only
- ☐ Maintenance documentation
- ☐ Software documentation
- ☐ Engineering changes
- ☐ Technical support—all hours
- ☐ Technical support—prime shift (M-F)
- ☐ Training

If you are a third party, which of the above items and from which vendor do you have a significant problem in obtaining?

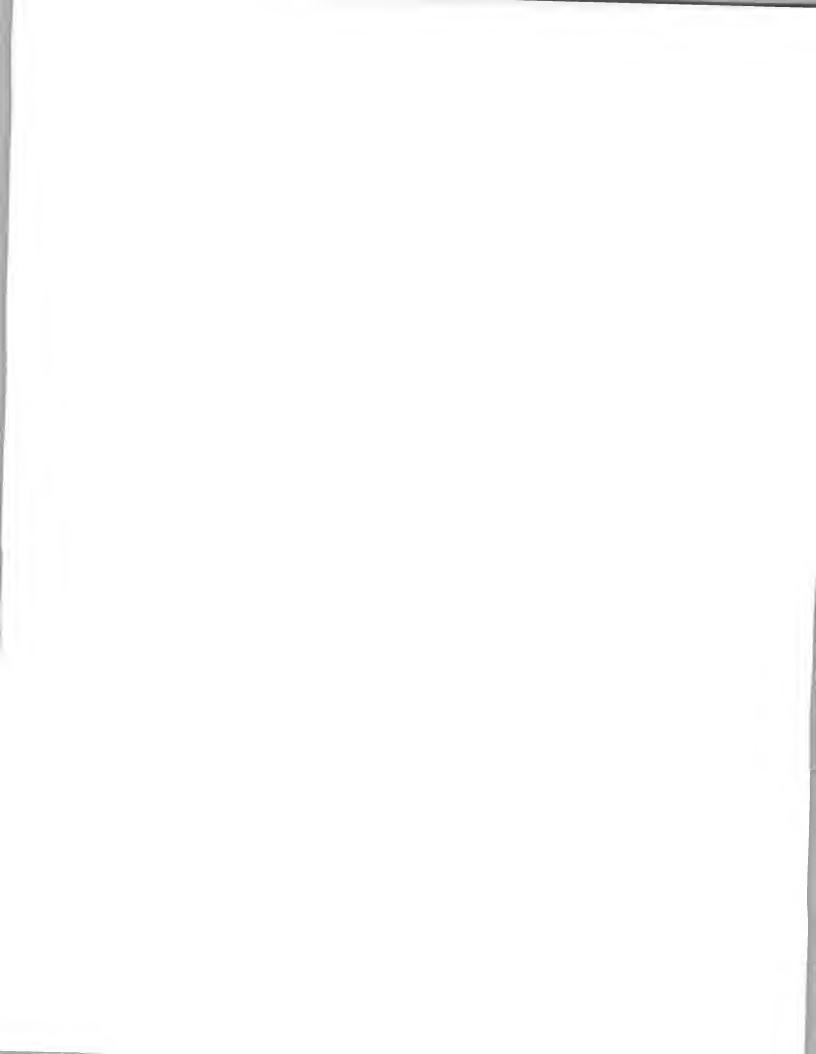
THANK YOU VERY MUCH FOR PARTICIPATING IN THIS SURVEY!





B

Appendix: Definitions





Appendix: Definitions

Applications Software - Software that performs processing to service user functions.

Artificial Intelligence - The academic discipline involving the study of the processes by which humans perceive and assimilate data (and use reasoning to process this data) for the purpose of duplicating these processes within computer systems. Also, this term refers to the computer systems that accomplish these duplicated processes.

BOC - Bell Operating Company.

Consulting - Includes analysis of user requirements and the development of a specific action plan to meet user service and support needs.

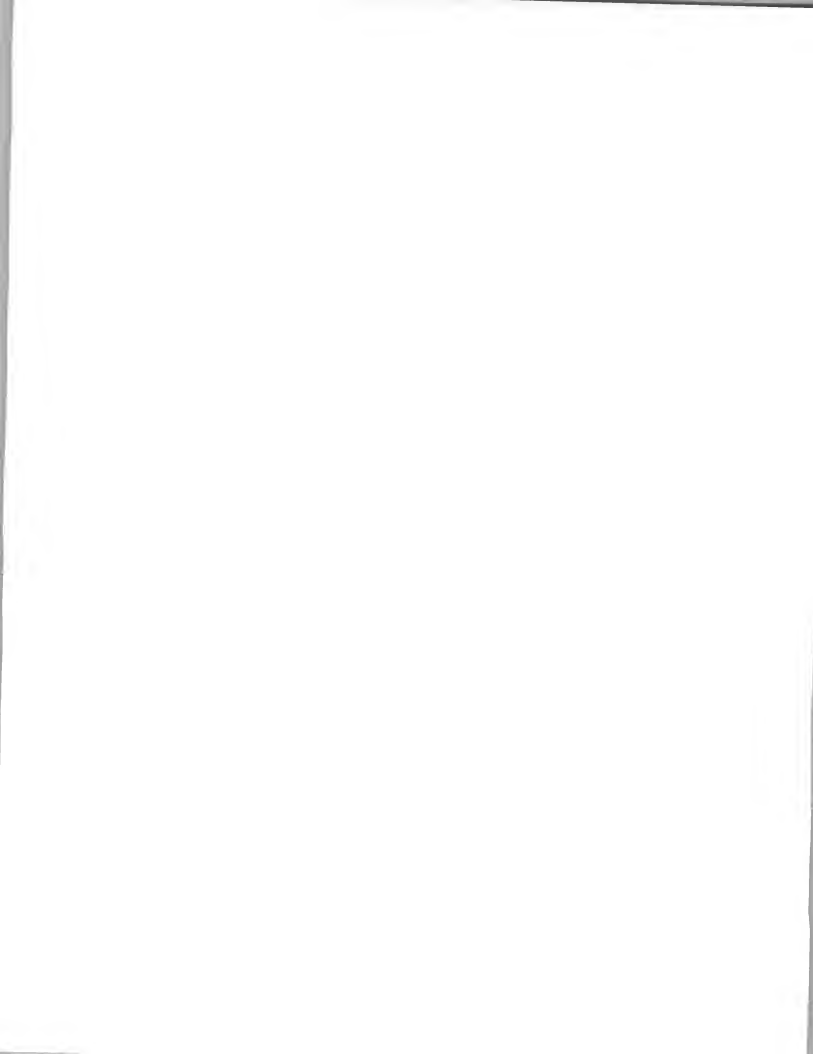
Dispatching - The process of allocating service resources to solve a support-related problem.

Divestiture - The action, stemming from antitrust lawsuits by the Department of Justice, which led to the breakup of AT&T and its previously owned local operating companies.

Documentation - All manuals, newsletters, and text designed to serve as reference material for the ongoing operation or repair of hardware or software.

End User - May buy a system from the hardware supplier(s) and do own programming, interfacing, and installation. Alternatively, may buy a turnkey system from a systems house or hardware integrator.

Expert Systems Applications - Applications for expert systems—a computer system based on a data base created by human authorities on a particular subject. The computer system supporting this data base



contains software that permits inferences based on inquiries against the information contained in the data base. Expert systems is often used synonymously with "knowledge-based systems," although this latter term is considered to be broader and to include expert systems within its scope.

Engineering Change Notice (ECN) - Product changes to improve the product after it has been released to production.

Engineering Change Order (ECO) - The follow-up to ECNs that include parts and a bill of material to effect the change in hardware.

Escalation - The process of increasing the level of support when and if the field engineer cannot correct a hardware or software problem within a prescribed amount of time, usually two to four hours for hardware.

Fiber Optics - A transmission medium which uses light waves.

Field Engineer (FE) - For the purpose of this study, field engineer, customer engineer, service person, and maintenance person were used interchangeably and refer to the individual who responds to a user's service call to repair a device or system.

Field Service Management System (FSMS) - A specialized application program that automates some (if not all) of the following activities of a field service organization: call handling, dispatching, parts inventory and tracking, billing, efficiency reporting, and other functions. Ideally, the system accesses one data base from which each function can use and modify data.

Hardware Integrator - Develops system interface electronics and controllers for the CPU, sensors, peripherals, and all other ancillary hardware components. May also develop control system software in addition to installing the entire system at the end-user site.

ISDN - Integrated Services Digital Network. A proposed standard for digital networks providing transport of voice, data, and image using a standard interface and twisted-pair wiring.

LADT - Local Area Data Transport. Data communications provided by the BOCs within local access transport areas (LATAs).

Large System - Refers to traditional mainframes including at the low end, IBM 4300-like machines, and at the high end, IBM 308X-like machines. Large systems have a maximum word length of 32 bits and a standard configuration price of \$350,000 and higher.

Mean Time Between Failures (MTBF) - The elapsed time between hardware failures on a device or a system.

Mean Time to Repair - The elapsed time from the arrival of the field engineer on the user's site until the device is repaired and available for use.

Mean Time to Respond - The elapsed time between the user placement of a service call and the arrival at the user's location of a field engineer.

Microcomputer - A microprocessor-based single or multiuser computer system typically priced at less than \$15,000. A typical configuration includes an 8- or 16-bit CPU, monitor, keyboard, two floppy disk drives, and all required cards and cables.

Minicomputer - See Small System.

Operating System Software (Systems Software) - Software that enables the computer system to perform basic functions. Systems software, for the purposes of this report, does not include utilities or program development tools.

PBX - Private Branch Exchange. A customer premises telephone switch.

Peripherals - Includes all input, output, and storage devices, other than main memory, which are locally connected to the main processor and not generally included in other categories, such as terminals.

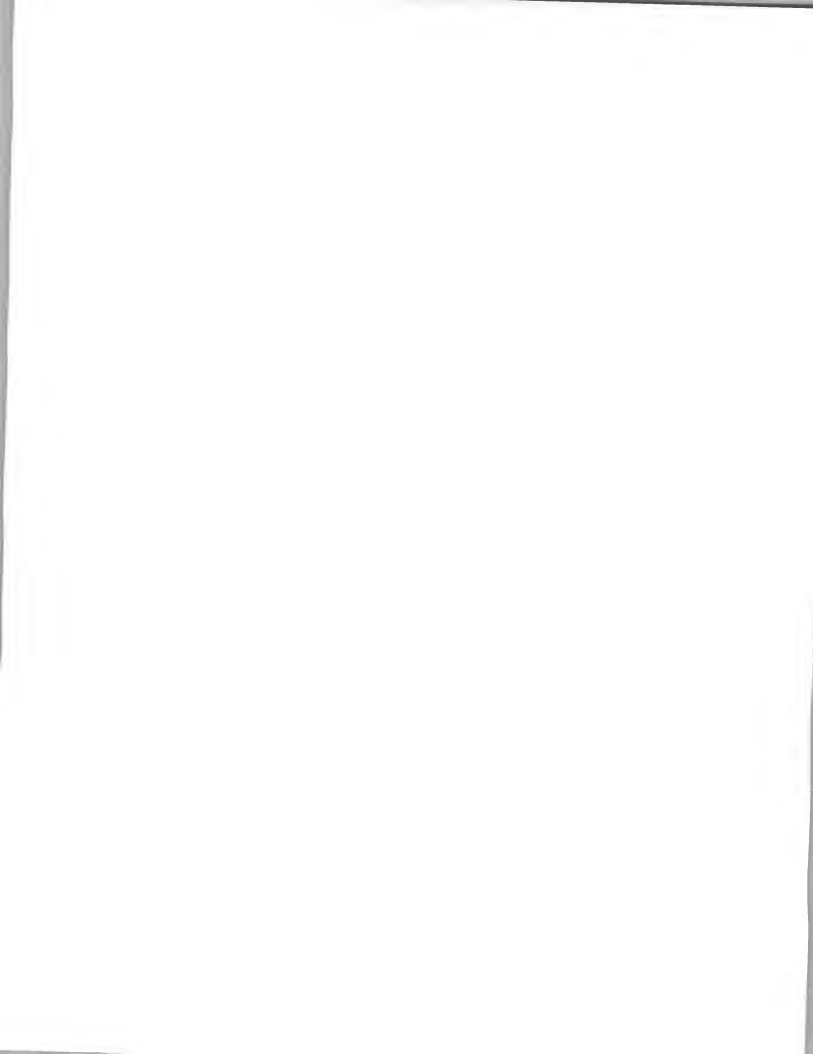
Planning - Includes the development of procedures, distribution, organization, and configuration of support services. For example, capacity planning and installation planning.

Plug-Compatible Mainframe (PCM) - Mainframe computers that are compatible with and can execute programs on an equivalent IBM mainframe. The two major PCM vendors at this time are Amdahl and National Advanced Systems.

Professional Services - A category of services including system design, custom programming, consulting, education, and facilities management.

RBOC - Regional Bell Operating Company. One of seven holding companies coordinating the activities of the BOCs.

Remote Diagnostics - Gaining access to a computer from a point physically distant from the computer in order to perform problem determination activities.



Remote Support Implementation - An extension of remote diagnostics where some level of support delivery is performed from a point physically distant from the computer. Currently, this capability is more common to software support, where problems can be solved or circumvented through downline loading of new code (fixes).

Reseller - A marketing organization which buys long-distance capacity for others at wholesale rates, selling services at retail but discounted prices and profiting on the difference.

Small Business Computer - For the purpose of this study, a system which is built around a Central Processing Unit (CPU), has the ability to utilize at least 20MB of disk capacity, provides multiple CRT workstations, and offers business-oriented systems software support.

Small System - Refers to traditional minicomputer and superminicomputer systems ranging from a small multiuser, 16-bit system at the low end, to a sophisticated 32-bit machine at the high end.

Software-Defined Network - A private network which uses public network facilities and which is configurable as necessary by the user (see Virtual Private Network).

Software Engineer (SE) - The individual who responds (either on-site or via remote support) to a user's service call to repair or patch operating systems and/or applications software.

Software Products - Systems and applications packages which are sold to computer users by equipment manufacturers, independent vendors, and others. Also included are fees for work performed by the vendor to implement a package at the user's site.

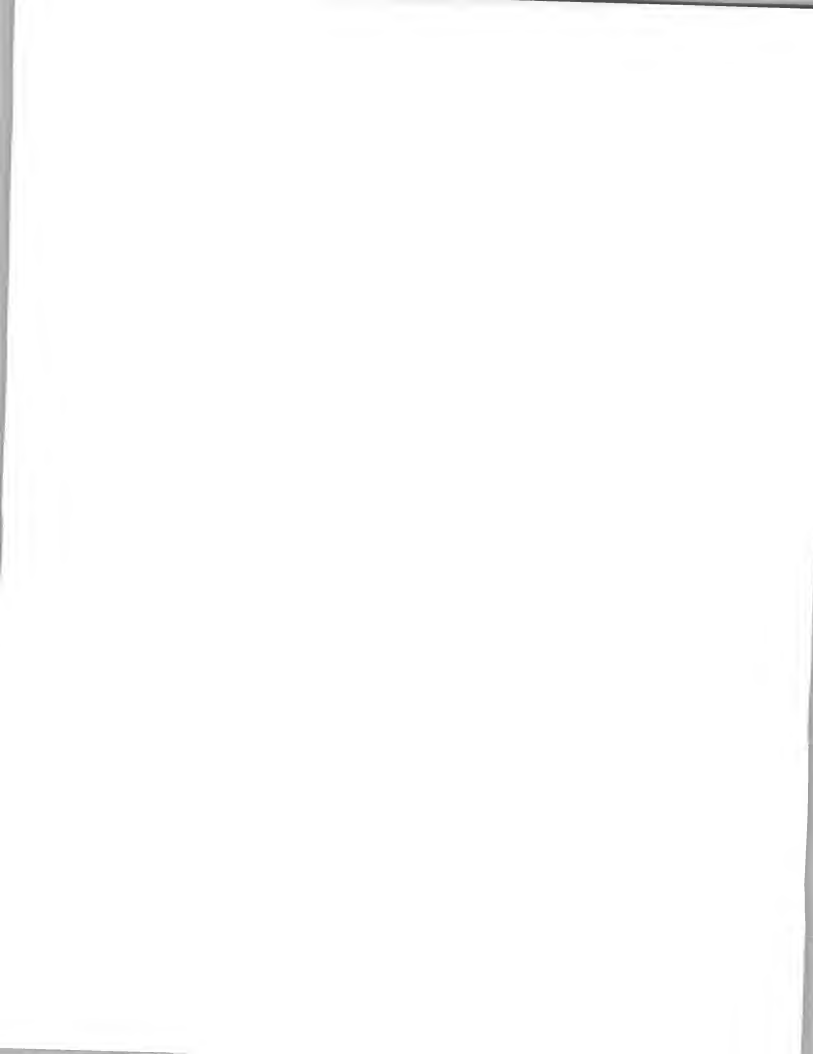
Superminicomputer - See Small System.

Systems Integration - A single service vendor's design, development, and implementation of a system or subsystem, including integration of hardware, software, and communications facilities, for a customer.

System Interruption - Any system downtime requiring an Initial Program Load (IPL).

Systems House - Integrates hardware and software into a total turnkey system to satisfy the data processing requirement of the end user. May also develop systems software products for license to end users.

T-I - Refers to a standard 1.544 megabit-per-second digital channel used between telephone company central offices and now used for microwave, satellite, fiber optics, or other bypass applications.



Third-Party Maintenance (TPM) - Any service provider other than the original equipment vendor.

Training - All audio, visual, and computer-based documentation, materials, and live instruction designed to educate users and support personnel in the ongoing operation or repair of hardware and software.

Turnkey System - Composed of hardware and software integrated into a total system designed to completely fulfill the processing requirements of a single application.

VSAT - Very Small Aperture Terminal. A small satellite dish system, usually using Ku-band frequencies.

Virtual Private Network - A portion of a public network dedicated to a single user.

